MUMBAI METRO RAIL CORPORATION LIMITED
(A JV company of Govt. of India and Govt. of Maharashtra)
5th Floor, A - Wing, Old MMRDA Building, Bandra-Kurla Complex, Bandra (E), Mumbai- 400 051.
MMRC e-Tendering portal: **www.tenderwizard.com/MMRC**
Website: **www.mmrcl.com**

Invitation of Bid For, "Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

Date: [7th September 2017]
Contract No: [MM3-CBS-DEM]

Addendum No: 1

Sr. No	Reference Clause no. and Description	Existing content to be deleted		To be replaced as	
1	Volume1,Section 1,**NIT** Clause 1.1.2 **KEY DETAILS**, Table Row 8 and 9, Page 1 & 2 of 10	Tender documents on sale	From 24-07-2017 to 31-08-2017 (up to 11:00Hrs) on e-tendering website www.tenderwizard.com/MMRC Tender Documents can be downloaded for reference purpose from the e-Tendering Portal www.tenderwizard.com/MMRC . Interested Bidders have to make online payment of Tender Fee using online payment gateway during bid preparation through Debit Card/Credit Card/Net-Banking. Tender Fee receipt can be system generated	Tender documents on sale	From 24-07-2017 to 04-10-2017 (up to 18:00Hrs) on e-tendering website www.tenderwizard.com/MMRC Tender Documents can be downloaded for reference purpose from the e-Tendering Portal www.tenderwizard.com/MMRC. Interested Bidders have to make online payment of Tender Fee using online payment gateway during bid preparation through Debit Card/Credit Card/Net-Banking. Tender Fee receipt can be system generated during bid preparation by the Bidder. For further information on this regard bidders are advised to contact on

<table>
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<tr><td></td><td></td><td><table>
<tr><td></td><td>during bid preparation by the Bidder.
For further information on this regard bidders are advised to contact on 011-49424365.</td></tr>
<tr><td>Date & time of Submission of Tender</td><td>08-09-2017 @ up to 1800 Hrs.</td></tr>
<tr><td>Date & time of opening of Tender (Tender Security + Technical)</td><td>09-09-2017 @ from 1100 Hrs</td></tr>
</table></td><td><table>
<tr><td></td><td>+91-7666563870, +91-7980042472, +9180-49352000 & on E-mail ID – twhelpdesk358@gmail.com</td></tr>
<tr><td>Date & time of Submission of Tender</td><td>05-10-2017 up to 1800 Hrs.</td></tr>
<tr><td>Date & time of opening of Tender (Tender Security + Technical)</td><td>06-10-2017 from 1100 Hrs.</td></tr>
</table></td></tr>
<tr><td>2</td><td>Volume 1,Section 1 – Notice Inviting Tender (NIT)
1.1.3.2 Minimum Eligibility Criteria : Similar works: , Page 4 of 10</td><td>** “Similar works” for this contract shall be the work of “Design, Supply, Installation, Testing and Commissioning of E&M works of Metro Station / Metro Depot / Mass Rapid Transit System (MRTS) / Commercial Buildings / Official Buildings / Railway Stations/ Airport/ Hospital buildings / Industrial establishment. Such E&M work can as well be part of a larger contract. E&M works shall be defined as work containing HT&LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the E&M works.</td><td>** “Similar works” for this contract shall be the work of “Design, Supply, Installation, Testing and Commissioning of E&M works of Metro Station / Metro Depot / Mass Rapid Transit System (MRTS) / Commercial Buildings / Official Buildings/ Railway Stations/ Airport/ Hospital buildings/ Industrial establishment. Such E&M work can as well be part of a larger contract. E&M works shall be defined as work containing HT&LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the stipulated value of required similar E&M work/s (i.e. 33.6 crores in case of one similar work or 21 crores in case of two similar works or 17.4 crores in case of three similar works).</td></tr>
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Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
3	Volume 1,Section 1 – Notice Inviting Tender (NIT) **1.1.3.2 Minimum Eligibility Criteria** ,Page no 4 & 5 of 10	In case the work(s) listed under A (i), (ii) or (iii) do not include at least one work with VAC component of minimum value of Rs. 4.0 Cr, then the tenderer should have executed any other work containing Design, Supply, Installation, Testing and Commissioning of VAC work component of Large Complex/ Metro Station/ Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/ Airport/ hospital buildings/ Industrial establishment of value Rs. 4.0 Crores or more. **And** In case the work(s) listed under A(i),(ii) or (iii) do not include at least one Work with Fire and Hydraulics System component of minimum value Rs. 4.0 Crores , then the tenderer should have executed any other Work containing Design, Supply , Installation, Testing and Commissioning of Fire and Hydraulics System of Large Complex/Metro Station/Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/Airport/hospital buildings/ industrial establishment of value Rs. 4.0 Crores or more	In case the work(s) listed under A (i), (ii) or (iii) do not include at least one work with VAC component of minimum value of Rs. 9.8 crores or more in case of single work or 6.1 crores or more , each in case of two works or 4.9 crores or more , each in case of 3 works respectively , then the tenderer should have executed any other work(s) containing Design, Supply, Installation, Testing and Commissioning of VAC work component of Large Complex/ Metro Station/ Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/ Airport/ hospital buildings / Industrial establishment of value Rs. 9.8 crores or more in case of single work or 6.1 crores or more, each in case of two works or 4.9 crores or more, each in case of 3 works respectively **And** In case the work(s) listed under A(i),(ii) or (iii) do not include at least one work with Fire and Hydraulics System component of minimum value Rs. 7.2 crores or more in case of single work or 4.5 crores or more , each in case of two works or 3.6 crores or more, each in case of 3 works respectively , then the tenderer should have executed any other work containing Design, Supply , Installation, Testing and Commissioning of Fire and Hydraulics System of Large Complex/Metro Station/Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/Airport/hospital buildings/ industrial establishment of value Rs. 7.2 crores or more in case of single work or 4.5 crores or more, each in case of two works or 3.6 crores or more, each in case of 3 works respectively **And**

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			In case the work(s) listed under A (i),(ii) or (iii) do not include at least one Work with HT Sub-Station / Distribution Works With Transformer, 33KV GIS and 33KV Cables installation system component of minimum value Rs. 4.5 crores or more in case of single work or 2.8 Crores or more each in case of two works or 2.2 crores or more each in case of 3 works respectively, then the tenderer should have executed any other Work containing Design, Supply , Installation, Testing and Commissioning of HT Sub-Station / Distribution Works With Transformer, 33KV GIS and 33KV Cables Installation System of Large Complex/Metro Station/Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/Airport/ hospital buildings/ industrial establishment/ Power Distribution Utilities or Company of value Rs. 4.5 crores or more in case of single work or 2.8 crores or more , each in case of two works or 2.2 crores or more, each in case of 3 works respectively.
4	Volume 1,Section 1 – Notice Inviting Tender (NIT) 1.1.3.2 **Minimum Eligibility Criteria A. General Experience** Note 2 paragraph Page 5 of 10	❖ Value of successfully completed portion of any ongoing work up to last date of submission will also be considered for qualification of work experience criteria.	❖ The value of completed work(s) shall be inclusive of taxes
5	Volume-1, Section -1 NIT, Clause 1.1.3.2-B **Financial Standing** ,Page 6 of 10	iii) T3: Net Worth: Net Worth of tenderer during last audited financial year should be >Rs. 7.00 Crores In Case of JV / Consortium, the algebraic sum total of Net Worth of all the members as per the latest audited balance sheets shall be considered the Net	iii) T3: Net Worth: Net Worth of tenderer during last audited financial year should be >Rs. 7.00 Crores In Case of JV- Net worth will be based on the percentage participation of each Member.

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
		Worth of the tenderer. Example: Let Member-1 has percentage participation = M and Member - 2 has =N. Let the Net worth of Member-1 is 'A' and that of Member-2 is 'B', then the Net worth of JV / Consortium will be = AM+BN / 100	Example: Let Member-1 has percentage participation = M and Member - 2 has =N. Let the Net worth of Member-1 is 'A' and that of Member-2 is 'B', then the Net worth of JV / Consortium will be = AM+BN / 100
6	Volume 1,Section 1, Clause 1.1.3.3 **Bid Capacity Criteria, Notes**, Page 7 of 10	Value of existing commitments for on-going construction works during period of 22 months w.e.f. **31.03.2017** has to be submitted by the tenderer in **APPENDIX-15 of FOT.** These data shall be certified by the Chartered Accountant with his stamp and signature.	Value of existing commitments for on-going construction works during period of 22 months w.e.f. **31.07.2017** has to be submitted by the tenderer in **APPENDIX-15 of FOT.** These data shall be certified by the Chartered Accountant with his stamp and signature.
7	Volume 1,Section 1 – **Notice Inviting Tender (NIT) Sub clause 1.1.8** Page No 8 & 9 of 10	Tender submissions will be made online after uploading the mandatory scanned documents Bid shall be submitted online on the e-tendering portal in **'Two electronic envelopes system'** within prescribed schedule. **A) e-Envelope 'A'** **(i) (Tender Fee, Tender Security)** Bidder should generate and upload scanned copies of Receipt for the following – Generate Receipt for e-tender fee Upload Tender Fee Receipt (RTGS / NEFT / Net banking / Credit card / Debit card) and Scan copy of Bank Guarantee /DD/Bankers Cheque /Pay Order towards Tender security. **(ii) (Technical Bid)** Bidder shall upload scanned copies of Technical Document as per RFP/Bid document. **B) e-Envelope 'B'**	Tender submissions will be made online after uploading the mandatory scanned documents Bid shall be submitted online on the e-tendering portal in **'Two electronic envelopes system'** within prescribed schedule. **A) e-Envelope 'A'** **(i) (Tender Fee, Tender Security)** Bidder should generate and upload scanned copies of Receipt for the following – Generate Receipt for e-tender fee Upload Tender Fee Receipt (RTGS / NEFT / Net banking / Credit card / Debit card) and Scan copy of Bank Guarantee /DD/Bankers Cheque /Pay Order towards Tender security. **(ii) (Technical Bid)** Bidder shall upload scanned copies which shall contain all the documents referred to in the paragraphs C2.2 and C2.3 except pricing document as per Clause C2.2 (c) of Section – 2 ,ITT of RFP/Bid document. **B) e-Envelope 'B'**

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
		(Financial Bid) Bidder shall quote his offer as percentage below / above / at par the estimated cost electronically based on his filled Financial Proposal (vol-6) at the prescribed space in the dialog box in Envelope- B1 Percentage Rate Tender Form. Under "MMRC- Financial Bid Percentage Rate" Under "Price Bid- Covering Letter" Upload the digitally signed copy of Tender document and Quotation in company's Letter head under the template" Price Bid- Covering Letter" bidder shall upload scanned copy of Financial Proposal (Financial Package) Volume 6 of Tender document duly Quoted/Filled	(Financial Bid) Bidder shall quote his offer as percentage below / above / at par the estimated cost electronically based on his filled Financial Proposal (vol-6) at the prescribed space in the dialog box in Envelope- B1 Percentage Rate Tender Form. Under "MMRC- Financial Bid Percentage Rate" Under "Price Bid- Covering Letter" Upload the digitally signed copy of Quotation in company's Letter head under the template" Price Bid- Covering Letter". Bidder shall also upload scanned copy of Financial Proposal which shall contain the documents referred to in paragraphs C2.2 (a); (b); (c).of Section 2 ,ITT of RFP/Bid document.
8	Volume 1,Section 1 – Notice Inviting Tender (NIT) 1.1.8 **Payment procedure for Tender Fee and Tender Security** Page 10 of 10	(In case of JV / Consortia, Bank Guarantee for Tender Security shall be in the name of JV / Consortia and not in name of individual members.) The Tender Security shall remain valid for a period of 180 days from the last date of submission of tender. The tenderer shall upload the scanned copy of the Bank Guarantee/ Demand Draft/Pay Order/Bankers Cheque as part of Envelope A on the online MMRC e-tendering portal only. **The bidder shall submit the original Bank Guarantee/ Demand Draft/Pay Order/ Bankers Cheque before the deadline of the submission of bid** at the office of the Executive Director (Electrical), MMRDA Building, 5th Floor, A-Block, Bandra Kurla Complex, Bandra –East, Mumbai-400051, India	Notes (In case of JV / Consortia, Bank Guarantee for Tender Security shall be in the name of JV / Consortia and not in name of individual members.) The Tender Security shall remain valid for a period of 180 days from the last date of submission of tender. The tenderer shall upload the scanned copy of the Bank Guarantee/ Demand Draft/Pay Order/Bankers Cheque as part of Envelope A on the online MMRC e-tendering portal only. **The bidder shall submit the original Bank Guarantee/ Demand Draft/Pay Order/Bankers Cheque before the deadline of the submission of bid** at the office of the Executive Director (Electrical), MMRDA Building, 5th Floor, A-Block, Bandra Kurla Complex, Bandra –East, Mumbai-400051, India 1) In case of Joint venture/Consortia, Tender security from Lead Partner in forms specified in b) & c) as above shall

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		Submission of Tenders shall be closed on e-tendering portal of MMRC on the date & time of submission prescribed in NIT after which no tender shall be accepted. It shall be the responsibility of the bidder / bidder to ensure that his tender is submitted online one tendering portal of MMRC before the deadline of submission. MMRC will not be responsible for non-receipt of tender documents due to any delay and/or loss etc. The lowest tenderer will have to submit the rate analysis of all major items if called for	also be acceptable without any prejudice to the right of MMRC for its forfeiture as per conditions of tender. 2) Submission of Tenders shall be closed on e-tendering portal of MMRC on the date & time of submission prescribed in NIT after which no tender shall be accepted. It shall be the responsibility of the bidder / bidder to ensure that his tender is submitted online one tendering portal of MMRC before the deadline of submission. MMRC will not be responsible for non-receipt of tender documents due to any delay and/or loss etc. 3) The lowest tenderer will have to submit the rate analysis of all major items if called for.
9	Volume 1,Section 1 – **Notice Inviting Tender** (NIT), Page 10		**Add :** **Sub-Clause 1.1.14** This Notice Inviting Tender will be governed by "*Public Procurement (Preference to Make in India) 2017, Notification No. P-45021/2/2017-B.E.-II Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion dated 15th June 2017*." The bidders who meet the requirements of Local supplier as per this circular shall be eligible for purchase preference and will have to give an undertaking as mentioned in ITT - Appendix-M (Verification of Local Content usage undertaking.) (Ref.-Attachment No.1)
10	Volume 1,Section 2 – Instructions to Tenderers (		**Add:**

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
	IIT) Clause A1.5 **Scope of Work** Page 2 of 70		Scope of work by Detailed Design Consultant(DDC) (Ref. Attachment No.2)
11	Volume-1- **Bidding Procedure** Section II – ITT under C2.2 Page no 13 of 70		**Add:** (vv) Appendix 22 – Form of Joint Venture/Consortium Agreement
12	Volume1Section-2, Instructions to Tenderer (ITT) (z) Annexure 4 to ITT: – **Requirement for Tenderer's Technical Proposals,** Page 14 of 70		**Add: (**Under **<u>Item (z) ,Annexure 4 to ITT: – Requirement for Tenderer's Technical Proposals)</u>** (n)Appendix M –Verification of Local Content usage undertaking.
13	Volume 1,Section 2 – Instructions to Tenderers (ITT) Clause C18 Tender Security Sub Clause C18.1 **Payment procedure for Tender Fee and Tender Security** Page 22 of 70	In case of JV / Consortia, Bank Guarantee for tender security shall be in the name of JV / Consortia and not in name of individual members. The Tender Security shall remain for a period of 180 days (both days inclusive i.e. the date of submission of tenders and the last date of period of validity of the tender) from the latest Date of Submission of Tender. Any deviation in Bid security with regard to amount, validity and format shall be considered as material deviation and bid shall be dealt accordingly. No clarification shall be sought from the bidders regarding bid security	**Notes** 1) In case of JV / Consortia, Bank Guarantee for tender security shall be in the name of JV / Consortia and not in name of individual members. The Tender Security shall remain for a period of 180 days (both days inclusive i.e. the date of submission of tenders and the last date of period of validity of the tender) from the latest Date of Submission of Tender 2) In case of Joint venture/Consortia Tender security from Lead Partner in forms specified in b) & c) as above shall also be acceptable without any prejudice to the right of MMRC for its forfeiture as per conditions of tender

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<tr><td></td><td></td><td></td><td>3). Any deviation in Bid security with regard to amount, validity and format shall be considered as material deviation and bid shall be dealt accordingly.

4) No clarification shall be sought from the bidders regarding bid security</td></tr>
<tr><td>14</td><td>Volume-1- Bidding Procedure Section II – ITT, ANNEXURES TO FORM OF TENDER, Page 37 of 70</td><td></td><td>Add:
<table><tr><td>49</td><td>Appendix 22</td><td>Form of Joint Venture/Consortium Agreement</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>15</td><td>Volume 1,Section -2 Instructions to Tenderer (ITT) (z) Annexure 4 to ITT: – Requirement for Tenderer’s Technical Proposals, Page 44 of 70</td><td></td><td>Add: (Under <u>Annexure 4 – Requirements of Tenderers Technical Proposals.</u>)

B13 The Technical proposal shall also contain Verification of Local Content usage undertaking (Refer Appendix-M to Annexure 4)
(Ref.-Attachment No.3)</td></tr>
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Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
16	Volume 1,Section -3 **– Form of Tender (FOT)** APPENDIX 8 **- POWER OF ATTORNEY (S)** Page no.17 of 32	APPENDIX 8	APPENDIX 8 (Revised) (Ref.-Attachment No.8)
17	Volume 1,Section 3,**FORM OF TENDER, APPENDICES**		**Add** APPENDIX 22 – Form of Joint Venture/Consortium Agreement (Ref.-Attachment No.9)
18	Volume 2,Section V– **Special Conditions of Contract** –Page 1 of 19		**Add:** **1 a) Sub clause 1.5 Priority of Documents** The documents forming the Contract are to be taken as mutually explanatory of one another. If there is an ambiguity or discrepancy in the documents, the Engineer shall issue any necessary clarification or instruction to the Contractor, and the priority of the documents shall be as follows: (a) The Contract Agreement (b) The Letter of Acceptance (c) Addendum1, 2, 3 & so on (d) Form of Tender (e) The Special Conditions of contract (f) The General Conditions of contract (g) BOQ/ The Employer's requirements - Technical Specifications (h) The Employer's requirements –General Specifications (i) Payment schedule (j) Tender Drawings

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
			(k) Pre and Post bid proceeds (l) NIT (m) ITT (n) The Contractor's proposal and (o) Any other document forming part of the contract.
19	Volume 2,Section V– **Special Condition of Contract – SCC39) Sub-Clause 17.7 Conciliation Procedure** Page no 13 & 14 of 19	For the purpose of conciliation in this contract, the conciliation shall be undertaken by one conciliator selected from panel of conciliators maintained by the employer, who shall be from serving or retired engineers of Government Departments, or of Public Sector Undertakings. Out of this panel, a list of three Conciliators shall be sent to the Contractor who shall choose one of them to act as Conciliator and conduct conciliation proceedings in accordance with "The Arbitration and Conciliation Act, 1996", of India. There will be no objection if conciliator so nominated is a serving employer of MMRC	For the purpose of conciliation in this contract, the conciliation shall be undertaken by one conciliator selected from panel of conciliators maintained by the employer, who shall be independent and impartial as defined in "The Arbitration and Conciliation Act, 1996", of India. Out of this panel, a list of three Conciliators shall be sent to the Contractor who shall choose one of them to act as Conciliator and conduct conciliation proceedings in accordance with "The Arbitration and Conciliation Act, 1996", of India.

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20	Volume 2,Section V– **Special Conditions of Contract –** , Page 19 of 19	**Additional Clause 59** Safe **Custody Bank Guarantee** Additional Clause Safe Custody Bank Guarantee (Applicable for items specifically mentioned in the contract). The Contractor shall submit a Safe Custody Bank Guarantee in the format given in Schedule 9 against payments made for Plant and Equipment delivered to Mumbai. The amount of safe custody Bank Guarantee shall be equal to 95% percent of the amount due as per the relevant clause of (BOQ) wherever applicable. The value of the Safe Custody Bank Guarantee would be adjusted for the equipments already commissioned**.**	**Additional Clause 59** (Not used)

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21	Volume 2,Section V– **Special Conditions of Contract** – , Page 19 of 19	**58.Additional Clause BOCW (Building and Other Construction Works) Cess** Bidders need to judge the applicability of BOCW for the work. Any liabilities on account of BOCW at any stage shall be on part of bidder and the quoted price shall be inclusive of BOCW charges. If same is not applicable, the bidder needs to submit required undertaking / certificates from the concerned authorities. The MMRC shall make the deduction accordingly and deposit the amount to the concerned authorities**.**	**58. Additional Clause BOCW (Building and Other Construction Works) Cess** Bidders need to judge the applicability of BOCW for the work. Any liabilities on account of BOCW at any stage shall be on part of bidder and the quoted price shall be inclusive of BOCW charges BOCW cess shall be deducted on Installation, alteration, repairs, maintenance or demolition excluding the cost of any items directly bought out by MMRC. Where the supply and installation portion of the contract value pertaining to erection, testing and commissioning are not separately identifiable in the contract and the invoice raise is composite one, BOCW shall be deducted on the 15% value of the invoice assuming that 85% value is for supply, If same is not applicable, the bidder needs to submit required undertaking /certificates. The MMRC shall make the deduction accordingly and deposit the amount to the concerned authorities
22	Volume 3 Employers Requirement **General Specification** APPENDIX 19 - **SYSTEM INTERFACE MANAGEMENT REQUIREMENT**	APPENDIX 19	APPENDIX 19 (Revised) (Ref.-Attachment No.7)
23	Volume 6 **BILL OF QUANTITIES**	Vol-6 Bill of Quantities	Vol-6 Bill of Quantities (Revised) (Ref.-Attachment No.6)

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<tr><td>24</td><td>Volume 4,Section VI-G EOT Cranes Technical Specification Appendix -1 Technical Parameter Page no 25 -27 of 45</td><td>A) (1) EOT CRANE 15/3T MAINTENANCE BAY
<table>
<tr><td>PARAMETER</td><td>SPECIFICATION</td></tr>
<tr><td>SPEED</td><td></td></tr>
<tr><td>2T Hoist (Slow/Fast)</td><td>0.5 - 12.5 m/min. (2 Speed Inverter control)</td></tr>
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A) (2) EOT CRANE 5/2T MAINTENANCE BAY LINE 1 AND ADD LINE 2
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<tr><td>SPEED</td><td></td></tr>
<tr><td>Main Hoist (Slow/Fast)</td><td>0.5 - 12.5 m/min. (2 Speed Inverter control)</td></tr>
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</table></td></tr>
<tr><td>25</td><td>Volume 4,Section VI-B Electrical LT Technical Specification FABRICATION DETAILS AND COMPONENTS Page no 37 of 154 5th line of Sub Clause 2.7.2.(a)</td><td>Boards shall be 16 gauge CRCA sheets and shall be folded and braced as</td><td>Boards shall be 2mm thickness CRCA sheets and shall be folded and braced as</td></tr>
</table>

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26	Volume 4,Section VI-B **Electrical LT Technical Specification** **Sub Clause 7.1.2.7**	**Sub Clause 7.1.2.7** Efficiency	**Sub Clause 7.1.2.7** Transformer Losses & Efficiency a. Transformer losses – The transformer shall be designed for minimum losses. Maximum permitted total Losses (percent of Transformer's ONAN rating) shall be not more than 1%.
27	Volume 4,Section VI-B Electrical LT Technical Specification 1.16 **CIVIL WORKS, CLEANING AND PAINTING** Page 4 of 154	Minor civil work items required for the work like making chases in walls/ceilings, making holes and openings, providing inserts, grouting sealing of cable trenches to prevent water entry inside rooms, required foundations for street light and high mast poles, pumps, platforms for diesel generators d, etc. including making good and painting the civil works	Minor civil work items required for the work like making chases in walls/ceilings, making holes and openings, providing inserts in trenches, grouting sealing of cable trenches to prevent water entry inside rooms, required foundations for street light and high mast poles etc. including making good and painting the civil works.
28	Volume 5 - **Drawings**	1. Section VII-A – HT 2. Section VII-B – LT 3. Section VII-F – BMS 1. Drawing No MM3-GC-DEL-GD-08-D09-1002 2. Drawing No MM3-GC-DEL-GD-08-D09-1004 & 1005 3. Drawing No MM3-GC-DEL-GD-08-D23-0001	1. Section VII-A – HT 2. Section VII-B – LT 3. Section VII-F – BMS 1. Drawing No MM3-GC-DEL-GD-08-D09-1002 (R1) 2. Drawing No MM3-GC-DEL-GD-08-D09-1004 & 1005 (R1) 3. Drawing No MM3-GC-DEL-GD-08-D23-0001 (R1) (Ref.-Attachment No.4)
29	Volume 5 - **Drawings**	Section VII-B – LT	Section VII-B – LT **Add New Drawings** Drawing No MM3-GC-DEL-GD-08-D09-1006 to Drawing No MM3-GC-DEL-GD-08-D09-1033 (Ref.-Attachment No.5)

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
30	Volume 3 Employers Requirement General Specification APPENDIX 28 - **LIST OF APPROVED MANUFACTURERS / SUPPLIERS or MAKES AND MATERIAL** FOR E&M WORK	Appendix 28	APPENDIX 28.(Revised) (Ref.-Attachment No.10)
31	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical –LT Sandwich Bus Duct	Page no 32 to 34	Page 32 to 34 (Revised) (Ref.-Attachment No.11)
32	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical – LT, Clause 2.2.7	2.2.7 Switchboard Busbars a) Busbars shall be made of high conductivity, high strength Copper, complying with requirements of grade E 91E of IS 5082 -1981. Design of busbar system shall comply to IS 5578 and IS 11353. Busbars shall be of rectangular cross sections suitable for full load current for phase bus bars and half rated current for neutral bus bar or as stipulated in schedule of quantities. The maximum current density shall be 1.4 amp per sq.mm. Busbar shall be suitable to withstand the stresses of fault level as specified in schedule of quantities.	2.2.7 Switchboard Busbars a) Busbars shall be made of high conductivity, high strength Copper, complying with requirements of grade E 91E of IS 5082 -1981. Design of busbar system shall comply to IS 5578 and IS 11353. Busbars shall be of rectangular cross sections suitable for full load current for phase bus bars and half rated current for neutral bus bar or as stipulated in schedule of quantities. Busbar shall be suitable to withstand the stresses of fault level as specified in schedule of quantities. **And ADD:** g) The busbar shall be air insulated, solid rectangular bars of electro-tin plated, hard drawn, high conductivity, 99%, copper bars and shall be mechanically braced to withstand the maximum symmetrical short-circuit

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
			current rating of the main breaker in each assembly h) The busbar shall have sufficient cross sectional area to continuously conduct rated full load current for operation in 50^0C ambient temperature and for limit temperature rise within the requirements of IEC-61439-1. The current carrying capacity of the busbar shall be of the bare busbar rating confirming to IEC-61439-1 i) Ground bus shall be of 50% size of phase bus and shall be furnished to the entire length of the switchboard.
33	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical –LT Clause 2.2.1 General	ACBs as also the switchboard shall be type tested design at CPRI / Independent test house for short circuit, temperature rise and dielectric tests of the ratings required as per BOQ.	ACBs as also the switchboard shall be of **TTA type (Total Type Tested)** at CPRI / Independent test house accredited by NABL. Further all the Type Test Reports shall be from the Panel Manufacturer only.
34	Volume-4 Employer Requirement **Technical Specification** Section VI-A- Electrical –HT Clause 4.2 - Auxiliary Sub Station Power Supply System	4.2.2 In line and continuation to the main power supply system, the cross section of the conducting core shall be single core 400sq.mm stranded copper. However DEM Contractor will use the results of the studies provided by Power Supply System contractor for verifying the ratings of equipment and cables.	4.2.2 The cross section of the conducting core shall be single core **120** sq.mm stranded copper. However DEM Contractor will use the results of the studies provided by Power Supply System contractor for verifying the ratings of equipment and cables.
35	Volume-4 Employer Requirement, **Technical Specification** Section VI-A-Electrical –HT Clause 7.7 - 33 KV Cables Network of MML-3	7.7.4.1 Single core 400 sq.mm stranded copper: Connection between Aarey Station 33kV Switchgear to ASS-2 and ASS-1 33kV GIS Switchgear's respectively	7.7.4.1 Single core 120 sq.mm stranded copper: Connection between Aarey Station 33kV Switchgear to ASS-2 and ASS-1 33kV GIS Switchgear's respectively

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
36	Volume-4 Employer Requirement **Technical Specification** Section VI-A- Electrical –HT Clause 7.7 - 33 KV Cables Network of MML-3	7.5.2 33 kV Feeder Breaker The protection shall consist of: a. F 50: Instantaneous over current protection b. F 51: Time delayed over current protection c. F50 N: Instantaneous earth fault protection (zero sequence) d. F51 N: Time delayed earth fault protection (zero sequence) to ADD MORE FROM NOIDA	7.5.2 33 kV Feeder Breaker The protection shall consist of: a. F 50: Instantaneous over current protection b. F 51: Time delayed over current protection c. F50 N: Instantaneous earth fault protection (zero sequence) d. F51 N: Time delayed earth fault protection (zero sequence).
37	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical –LT Clause 1.20 – Supply of Manuals, drawings, etc.	2.2.2 SHOP DRAWINGS ON AWARD OF WORK BEFORE COMMENCEMENT The Contractor shall furnish manufacturer's test certificates in respect of materials/ equipment's / components used on work as required and shall submit shop drawings for all works as indicated in the tender to GC (MEP) / MMRC (MEP) for approval before commencement of work at site/ fabrication/ manufacture.	2.2.2 SHOP DRAWINGS ON AWARD OF WORK BEFORE COMMENCEMENT The Contractor shall furnish manufacturer's test certificates in respect of materials/ equipment's / components used on work as required and shall submit shop drawings for all works as indicated in the tender to Engineer/ Employer for approval before commencement of work at site/ fabrication/ manufacture.

Sr. No	Reference Clause no. and Description	Existing content to be deleted	To be replaced as
38	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical –LT Clause 2.3 External Feeder Pillar.	2.3.1 CONSTRUCTION FEATURES The Feeder Pillars shall be sheet cabinet for outdoor installation, dead front, floor mounted. The Distribution Panel shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors, Neoprene gasket and padlocking arrangement shall be made. Steel sheets used in the construction of Feeder pillar shall be 3mm thick for structural members and 2mm thick for doors & covers and shall be folded and braced as necessary to provide a rigid support for all components. Ingress rating protection of feeder pillars shall be not less than IP-55.	2.3.1 CONSTRUCTION FEATURES The Feeder Pillars shall be sheet cabinet for outdoor installation, dead front, floor mounted. The Distribution Panel shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors, Neoprene gasket and padlocking arrangement shall be made. Steel sheets used in the construction of Feeder pillar shall be 3mm thick for structural members and 2mm thick for doors & covers and shall be folded and braced as necessary to provide a rigid support for all components. Ingress rating protection of feeder pillars shall be not less than **IP-65.**
39	Volume-4 Employer Requirement **Technical Specification** Section VI-B- Electrical –LT 2.10. CONVENTIONAL & MAINTENANCE FREE EARTHING.	2.10.2 STANDARDS The earthing system shall be TN-S and carried out in conformity with the updated current edition of IS 3043: 1987. In addition, relevant clauses of Indian Electricity Act 1910, India Electricity Rules 1956 and IEE Wiring Regulations (16th editions), IEEE -8, as amended up-to-date, shall also be applicable.	2.10.2 STANDARDS The earthing system shall be TN-S and carried out in conformity with the updated current edition of IS 3043: 1987. In addition, relevant clauses of Indian Electricity Act **2003**, India Electricity Rules 1956 and IEE Wiring Regulations (16th editions), **IEEE -80**, as amended up-to-date, shall also be applicable.
40	Volume-4 Employer Requirement Technical Specification Section VI-B- Electrical –LT 2.16.2 Section-II **Technical Specification**	2.16.2.16 LIST OF APPROVED MAKES on 146 to 148 of 154 5 Vendor Approval on page number 152 to 154	2.16.2.16 DG SET DATA SHEET

MUMBAI METRO RAIL CORPORATION LIMITED Mumbai Metro Line-3 Project Response to Bidder's Queries on Volumes 1 to Volume-6 for Contract No. MM3-CBS-DEM Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"						MMRC'S RESPONSE / CLARIFICATION dated 6th September 2017
Sr. No.	**Volume**	**Section**	**CLAUSE No. / Sub Head / BOQ Sr.No.**	**PAGE No.**	**Relevant Abstract from Tender**	**Bidder's Queries**	**MMRC'S RESPONSE**
1	1	NIT	1.1.3.2 Minimum Eligibility Criteria	4 of 10	E&M works shall be defined as work containing HT & LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the E&M works.	E&M work in metro installation (like DMRC, JMRC, KMRC etc.) comprise of Electrical LT work, HVAC, Firefighting & Plumbing works. HT work is a separate package. Hence we request that HT work be treated seperately like VAC & Fire & Hydraulics system with minimum value Rs. 4.0 Cr.	Please refer Addendum-1 Sr.No. - 3
2	1	ITT	A 1.5	1 of 70	The contractor shall have a Detailed Design consultants (DDC) under this contract.	This being BOQ based percentage rate tender; equipment / material rating, quantities etc are already designed and fixed. Hence, bidders scope shall be limited to Design Validation, Detail Engineering, Manufacture, supply, installation, testing and commissioning only. In view of this DDC (if required) scope shall be limited to design validation only.	Please refer Addendum-1 Sr.No. - 26
3	2	SCC	26	11 of 19	Mobilisation advance	Kindly consider 10% advance against 5% mentioned in clause no. 26	Tender conditions prevail
4	2	SCC	47	16-17 of 19	Stage payment	We request to kindly consider following prorata terms of payments: A. 10 % Mobilisation advance. B. 75% against supply. C. 10% against installation & D. 5% against testing, commissioning & handover.	Tender conditions prevail
5	4	General	1.4 Relevant Documents	6 & 7	The priority order of documents is as indicated (sorted from highest to lowest priority): a. Technical Specification including appendices b. General Specification c. International Standards Please referenced herein d. Indian Standards e. Other Indian Railway Standards f. Other International Standards	In the event of a conflict between Vol. 6 - BOQ and Vol 4 - Technical Specification, kindly confirm order of priority over which of the above shall prevail.	Please refer Addendum-1 Sr.No. - 18
6	Vol 1	Section 3 - FOT	Appendix 1, Sr.no. vii, viii, ix, & x	4 of 32	1) Professional indemnity : 2. Installation All Risks Insurance: 3. Third Party Insurance:	Kindly confirm whether one single policy covering all risks is acceptable.	Tender conditions prevail
7	Vol 2	Section 5 - SCC	Additional Clause : BOCW (Building and Other Construction Works) Cess, Sr.No 58.	19 of 19	BOCW (Building and Other Construction Works) Cess	Kindly confirm what will be the % deduction and whether MMRC will deposit the same under their Registration.	Tender conditions are self explainatory. Please refer Addendum-1 Sr.No. - 21
8	Vol.2	Section 4 - GCC	Clause 8.5	41 of 71	Applicable liquidated damage shall generally by 0.5% of the contract value per one week delay with an upper limit of generally 10% of the contract value.	We request you to accet the LD upper limit as 5% of the contract value.	Tender conditions prevail
9	4	2.2. LT Panel Specifications	Sr.No.2.2.5	20 of 154	a) Base Channel 100mm X 50mm X 3 mm thick shall be provided at the bottom. b) A minimum of 275 mm blank space between the floor of switch board & bottom most unit shall be provided. c) The over all height of the switchboard shall be limited to 2300 mm unless otherwise stipulated. d) the height of the operating handle, push button etc shall be restricetd between 300mm & 1900 mm from floor level	The panels shall be as per CPRI certification	Tender conditions prevail These shall be as per Volume 4,Section VI-B, Clause 2.2.4 & 2.2.6

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10	6	PART-A (Depot ASS- HT)	BOQ		HT DEPOT LT	There are three price fillid in columns unit price, amount & total amount. Kindly confirm which price given in columns is unit price.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
11	6	PART-A (Depot ASS- HT)	BOQ		Unpriced items in the BOQ	Some of the items in the BOQ are unpriced such as items in Earthing strips & Cables, Fuel system. Cost of these might not be included in the total amount of Cost Estimate For Aarey Station and Depot with OCC Building.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
12	6	Scedule of Bill of quantity	BOQ		Priced items in the BOQ	Given unit price (INR) & Amount (RS) are not matching, Kindly clarify	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
13	6	PART-B (Aarey Depot Building)	E.01 M V SWITCHGEAR	12 of 270	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from 2 mm thick CRCA sheets with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 65 kA for ASS - I & ASS- II at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.	All load bearing members of the panel shall be fabricated of 2 mm CRCA sheet steel and non-load bearing members shall be 1.6 mm thick. Kindly confirm.	Tender conditions prevail
14	6	PART-B (Aarey Depot Building)	E.01 M V SWITCHGEAR 10.1 Safety equipments in Aux. Substation/MDB room	42 of 270	a) High electro mat high voltage (11kV grade) mat of 6 MM thick and 1000 mm wide and length on per LT panel requirement as per IS 15652-2006. e) Fire Buckets (Quantity will be in fire fighting BOQ)	Kindly provide the quantity of mat. Kindly confirm whether cost of fire buckets is to be considered in this item or in fire fighting BOQ item.	Part of detailed design. For estimation please refer Architectural drawings in Volume-5
15	6	PART-B (Aarey Depot Building)	E.02 DISTRIBUTION BOARDS	49 of 270	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3- phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bus bar assembly, phase segregating barriers, LED indicating lamps for incoming feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature range as per IS 694 FRPVC wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:	All load bearing members of the panel shall be fabricated of 2 mm CRCA sheet steel and non-load bearing members shall be 1.6 mm thick. Kindly confirm.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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16	6	PART-B (Aarey Depot Building)	E.03 DISTRIBUTION CABLES BOQ Sr.No.. 1	53 of 270	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables on existing trays / walls/columns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.	Kindly confirm that cable terminations shall be paid seperately under BOQ E.03 - Sr.No.. 2	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
17	6	PART-B (Aarey Depot Building)	E.03 DISTRIBUTION CABLES BOQ Sr.No.. 1.A	54-55 of 270	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FIRE SURVIVAL CABLE, XLPE, Copper (CU) conductor cables on existing trays / walls/columns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.	Kindly confirm that cable terminations shall be paid seperately under BOQ E.03 - Sr.No.. 2.A	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
18	6	PART-B (Aarey Depot Building)	E.03 DISTRIBUTION CABLES BOQ Sr.No.. 1.B	55 of 271	laying of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor following above given cables direct buried in ground including the cost of excavation, refilling, including with sand & brick including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, refilling, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.	Kindly confirm that only cost of excavation, refilling, sand & bricks is to be considered here as the cable laying rates are already included in BOQ Sr.No.. E.03 - Sr.No.. 1 & 1.A	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
19	6	PART-B (Aarey Depot Building)	E.03 DISTRIBUTION CABLES 1.A FIRE SURVIVAL CABLE, XLPE, Copper (CU) conductor cables	55 of 270	BOQ Sr.No.. iii, iv & v	For cables in BOQ Sr.No.. iii, iv & v Fire survival is not mentioned and Sr.No.. iii is Al cable. Kindly confirm whether all cables under BOQ Sr.No.. 1A are Fire survival Cu. Cables or the cables shall be as per BOQ description i.e non Fire survival in case of Sr.No.. iii, iv & v and Al condutor for Sr.No.. iii.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
20	6	PART-B (Aarey Depot Building)	E.03 DISTRIBUTION CABLES BOQ Sr.No.. 2 & 2 A	55 of 271	Cable termination Glands	Kindly confirm whether all Glands shall be 'Flame proof' or for BOQ Sr.No.. 2 Glands shall be double compression weather proof glands and for BOQ Sr.No.. 2.A Glands shall be ' Flame proof'.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
21	6	PART-B (Aarey Depot Building)	E.04 CONDUIT WIRING BOQ Sr.No.. 1 & 2	58-62 of 271	Modular accessories like switch socket, box, plates etc., 3 phase socket outlets and weather proof outlets	Kindly confirm that the modular accessories like switch socket, box, plates etc., 3 phase socket outlets and weather proof outlets mentioned in BOQ Sr.No.. 1 (1.1 to 1.69) shall be paid seperately under BOQ Sr.No.. 2. (2.1 to 2.6)	Sr.No. 1.1 & 1.6.9 includes Supply & Installation of point wiring material including all modular accessories like switch, socket, box, plates, etc and will not be paid seperately under BOQ Sr.No. 2 (E.04, 2.1 to 2.6)

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22	6	PART-B (Aarey Depot Building)	E.06 HIGHMAST & STREET LIGHT POLES	65 of 272	Foundation for high mast & Light poles	Foundation for High Mast and Poles shall be provided by Civil agency and bidders scope shall be limited to provide necessry drawings / details for foundation. Kindly confirm.	Please refer Addendum-1 Sr.No. - 27
23	6	PART-B (Aarey Depot Building)	E.07 PROTECTIVE EARTHING SYSTEM BOQ Sr.No.. 1.1 to 1.3	66 of 272	Design,Supply, laying, testing and commissioning of 25 mm dia copper and 50X6mm copper flat for earth mat (at 700 mm to 3000 mm deep as per approved drawing & calculations) as per specifications including lap (of not less than 150 mm) & cross weld joints and providing bitumin coat at every joint as required. Earthing risers from earth mat to be brought out as per approved drawings and specifications wherever required.	Kindly confirm that 25 mm dia copper rod shall be paid under BOQ Sr.No.. 1.2 and Bitumin coating under BOQ Sr.No.. 1.3	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
24	6	PART-B (Aarey Depot Building)	E.10 COMPACT SANDWICH TYPE BUS DUCT	58-62 of 273	Busduct enclosure 14 SWG sheet steel clad	Requesting to accept 16 SWG sheet steel / Al. enclosure as manufactures provide enclosure as per their manufacturing practice.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
25	6		Depot Fire BOQ: F.02 - 1.8		Providing & fixing Stainless steel cabinet (to enclose FB connection,draw off connection & for external hydrants) fabricated from 16 g sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx 0.75m x 0.6m x 0.25m)	Instead of mounting the cabinet on masonary platform we propose to mount it on 4 nos MS angle (40 x 40 x 8) supports grouted in floor and duly coated.	Tender conditions prevail
26	6		Depot Fire BOQ: F.02 - 1.18		Providing and laying non-pressure NP2 class (light duty) R.C.C pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc.complete. -250 mm dia. R.C.C pipe	Kindly confirm whether excavation is to be considered for laying RCC pipes or it shall be in civil scope.	Tender conditions prevail Excavation is included in laying of RCC pipes.
27	6		Depot Fire BOQ: F.02 - 1.19		Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) all-round R.C.C pipes including bed concrete as per standard design.	Kindly confirm the thickness of concrete.	Part of detailed design.
28	6		Depot Fire BOQ: F.02 - 1.20		Providing & fixing brass quartzoid sprinklers (UL approved) of 15 mm dia size, suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :	Kindly bifurcate the quantity of sprinklers for Pendant type & Upright type.	Part of detailed design.
29	6		Depot Fire BOQ: F.02 - 1.21		Providing and fixing inspector's test assembly complete with test value, sight glass Sectional drain valve union with corrosion resistant orifice all complete	Kindly provide the size of the valve.	Part of detailed design.
30	6		Depot Fire BOQ: F.02 - 1.25		Providing and fixing 200 mm & 80 mm Y TYPE strainer with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Volume 4 - Clause 2.13 calls for Y Strainer with Stainless steel wire mesh. Kindly confirm	Please refer Addendum-1 Sr.No. - 18
31	6		Depot Plumbing BOQ: 2,3,4,5 & 6		Transfer pumps, Filter feed pumps, submersible pumps & drain pumps - (1W+1S); UOM- "Each"	Kindly clarify the unit of measurement (UOM) to be read as "Set" and not "Each".	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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32	6		Depot Plumbing BOQ: 7		Providing and fixing Transistorised liquid level controllers with low voltage relays and seamless steel probes and PVC shroud, including necessary wiring and conduiting from probes to display panel/motor control panels and to provide Audible Alarm for low level for each underground tank. (The cost of all required cabling from probes to motor control panels to be including in the rates).	Kindly provide the length of cable & conduit.	Part of detailed design, This is to be estimated from depot lay out and Architectural drawings.
33	6		Station Plumbing BOQ: 1.3		BORING OF TUBEWELL	Kindly confirm the number of tubewells to be drilled.	The estimated number is related to number of submersible tublewell pumps provided in BOQ The exact number of tubewell / pumps shall be part of detailed design
34	6		Station Fire BOQ: F.02 - 1.3		iii) 63 mm synthetic synthetic hoses (UL Listed) with 63 mm instantaneous SS coupling, IS marked- 15 m x 2 lengths with suitable arrangement of connecting the hose pipe with coupling as required.	Can we consider non UL listed Synthetic hose as per IS 636 Type A instead of UL listed ?	Tender conditions prevail
35	4		Volume 4 : Fire Protection System ;Clause 1.5 & 1.10		PUMP FOUNDATION: Foundation of pumps in Fire Pump rooms should be of considerable height so that these are not submerged in case of overflow.	Kindly confirm construction of Foundation for Fire & Plumbing pumps shall be in Civil scope or Contrator scope. We propose it be in civil scope. Contractor shall provide the GA drawings as per the manufacturer standard.	Please refer Addendum-1 Sr.No. - 27
36	4		Volume 4 : Fire Protection System ;Clause 2.10		The Ball Valve shall be made from die cast brass and tested to 14 Kg/cm2 pressure. The valve shall be internally threaded to receive pipe connections. The Ball shall be made from brass and machined to perfect round shape and subsequently chrome plated. The seat of the valve body-bonnet gasket and gland packing shall be of Teflon.	The BOQ calls for Gun Metal MOC Ball valve and technical specs define Cast brass. Kindly confirm	Please refer Addendum-1 Sr.No. - 18
37	6		BOQ : Depot Fire & OCC Fire		Hydrant/ Landing valve & Hose reel drum	The BOQ does not have line item for Internal & External Landing valve & Hose Reel drum.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
38		General			List of Makes	List of approved makes is not provided whereas the same is given in DG specification. Kindly provide list of makes for all items. In case bidder has to propose makes then the bidder shall not confine to makes give in BOQ & Specifications.	Please refer Addendum-1 Sr.No. - 30 (Volume-3, Revised Appendix-28)
39		General			Query & clarification	The above given queries are applicable to Part A, B, C & D and reply / clarifications shall be applicable respectively.	Agreed

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40	1	Section -1-NIT	1.1.8. B		Upload the digitally signed copy of Tender document and Quotation in company's Letter head under the template" Price Bid- Covering Letter" bidder shall upload scanned copy of Financial Proposal (Financial Package) Volume 6 of Tender document duly Quoted/Filled.	In a 2 envelope bid the 1 st envelope i.e. technical bid normally comprise of Tender Fee, EMD, Technical documents along with signed stamped tender document including unpriced BOQ. As per clause 1.1.8 B, digitally signed copy of Tender document is to be submitted in Financial bid. Kindly confirm. This being Percentage Rate Tender only Price Bid-Covering Letter i.e. 1.5 Percentage Rate Tender Form (Envelop B1) shall be filled by the bidder and Financial Proposal (Financial Package) Volume 6 of Tender document duly Quoted/Filled shall not be required. Kindly confirm.	Please refer Addendum-1 Sr.No. - 7
41	4	Section -2 -ITT	C15.1	21 OF 70	The Pricing Document is included in Bill of Quantities/Pricing Document; Volume 6. The Tenderer shall complete the Pricing Document in accordance with the instructions given in Bill of Quantity/Pricing Document. The completed Pricing Document including price of minor deviations in Appendix-C for such deviation as mentioned in Annexure-4 of ITT shall be submitted	Bidder shall quote his offer as percentage below / above / at par with respect to the estimated cost. Pricing document (filled) is not required. Kindly confirm.	Please refer Addendum-1 Sr.No. - 07
42	4	Section VI-B	2.1.2 ACB	14 of 154	k) Protection : The true RMS sensing microprocessor based communication upgradeable numerical release with intrinsic RS 485 port for communication by open protocol shall be provided on circuit breaker for offering protection against overload (long time) with adjustable time delay, short circuit (short time) with intentional delay, earth fault protections with intentional time delay & instantaneous protection all with adjustable settings. There shall be LED / LCD display for showing the actual value percentage loading in each phase built in the trip unit. The release shall have an LED/LCD display to show RMS current in all three phases, neutral (4 pole),all energy & power parameters including Maximum demand.	In Schedule of Electrical Bill Of Quantity, RS485 Portis not asked in any ACB. Not any metering parameters asked, only LSIG protection asked in Outgoing ACB. So BOQ and specifications are not matching. Please conform actual requirement.	Please refer Addendum-1 Sr.No. - 18
43	4	Section VI-B	2.1.3 MCCBs.	17 of 154	q) Earth fault protection shall be inbuilt feature of MCCB. For TP MCCBs external Neutral CT shall be provided to avoid nuisance tripping due to unbalance loads.	In Schedule of Electrical Bill Of Quantity, MCCB asked only with variable overcurrent and short circuit releases. No MCCB available in market which has inbuilt feature for Earth fault protection. If Earth fault protection is required than MCCB with variable overcurrent, short circuit and Earth fault releases has to be selected. Please clarify.	Tender conditions prevail
44	4	VI B	2.2.6 SWITCHBOARD COMPARTMENTALIZATION	19 of 154	k) 25% spare cubicles/ space shall be provided in all switchboards to cater for future use.	As per clause No. 2.2.2 of Volume 4, Section VI-B-Electrical -LT SWITCH BOARD CONFIGURATION : The switchboards shall be of adequate size with a provision of 15% spare space to accommodate possible future additional switchgear. Please confirm actual requirement.	Details mentioned in Volume-4, Section-VI-B, Clause-2.2.6 shall prevail.

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45	4	VI B	2.2.4 CONSTRUCTIONAL FEATURES	20 of 154	g) The Main distribution panels and sub-main distribution panels are floor standing, meta- clad in Form 4b type with separation panels. These switchboards are designed and manufactured in accordance with IEC61439 standard with IP54 protection. All switchboards shall be 25% spare circuit breakers providing for future loads installation.	Number of Outgoing ACB/MCCB is clarified in BOQ, so Please Please confirm whether 25% more feeders to be added over BOQ quantities written in Switchboard BOQ.	Confirmed
46	4	VI B	2.2.4 CONSTRUCTIONAL FEATURES	20 of 154	e) The switchboard shall be designed for use in high ambient temperature and humid tropical conditions as specified. Ease of inspections, cleaning and repair while maintaining continuity of operation shall be provided in the design.	Ambient temperature and limited of Temeperature rise is not defined in tender, kinldy clarify.	Please refer Addendum-1 Sr.No. - 32
47	4	VI B	2.2.7 SWITCHBOARD BUS BARS	21 of 154	a) The maximum current density shall be 1.4 amp per sq.mm. Busbar shall be suitable to withstand the stresses of fault level as specified in schedule of quantities.	Please confirm whether busbars shall be selected as per Type tested design or 1.4 amp per sq.mm of the rating written in BOQ. Also confirm busbar shall be Tinned plated or base copper.	Please refer Addendum-1 Sr.No. - 32
48	4	VI B	2.2.7 SWITCHBOARD BUS BARS	21 of 154	b) Bus bars shall be insulated with head shrunk PVC sleeving of 1.1KV grade and bus bar joints provided with clip-on shrouds.	As per type tested design PVC heat srincable sleeving is not possible, request to delete it.	Tender conditions prevail
49	4	VI B	2.6.2	32 of 154	Bus Trunking System - IEC 61439 - 4	As per latest standards Bus Trunking System shall be as per IEC 61439 - 6 kindly confirm	Please refer Addendum-1 Sr.No. - 31
50	4	VI B	2.6.5	34 of 154	Current Density shall not be more than 1 A per sqmm	As per IEC Sandwich Bustrunking design is based on temperature rise calculation and not on current density. kindly confirm	Please refer Addendum-1 Sr No. - 31
51	4	VI B	2.6.5	33 of 154	Insulation material class B & polYester insulation to give minium class F	Kindly clarify required Class of Insulation B (130 deg C) or F (upto 155 Deg C)	Please refer Addendum-1 Sr No. - 31
52	4	VI B	2.6.10	35 of 154	Current withstand capacity for Lighting Bus Trunking System	As per CPRI type tested	Tender conditions prevail
53	4	VI B	2.6.4	33 of 154	Temparature Rise	Temparature rise shall be as per latest IEC 61439 - 6.	Confirmed.
54	4	VI B	2.6.7	34 of 154	Type Test Certificates	Kindly accept Bus Dcut certification as per CPRI / ERDA / ASTA	Details mentioned in the clause are self explainatory
55	4	VI A	7.2.6.8	36	Cable Termination shall be inner cone plug in type in accordance with EN 50181	Cable Termination type shall be inner / outer cone type as per IEC. Inner cone termination is specifically applicable for HV GIS only (66KV & Above)	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
56	4	VI A	7.2.6.i	33	The circuit breaker shall be provided with two shunt trip coils connected in parallel arrangment	Kindly clarify the requirement of Two trip coils.	Tender conditions prevail
57	4	VI A	7.2.3	31	Short Time Rating	As per specs it is 25KA for 1 sec wherein BOQ 31.5 KA mention. Kindly clarify the actual requirement	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
58	4	VI A	7.2.6.8	36	Cable Entry	As per specs it is bottom entry wherein BOQ cable at the bottom or alternatively top. Kindly confirm actual requirement	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
59	4	VI A	7.2.3	31	Current Rating	As per Specs it is 1250 A & as per BOQ it is 630A. kindly cofirm actual requirement.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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60	4	VI A	7.2.6.10, 7.2.6.11 & 7.5.2	36 & 37	CT, PT, Realy & Metering	Please mention the CT,PT-ratio,class,Burden.Please also specify the protections required in the relay,relay protocol,etc.Please also specify the meter details like class,communication	Part of detailed design.
61	4	VI A	7.2.6.11	36 & 37	PT Panel	Please confirm if PT panel is required.Also Please confirm if the same is bus or line connected	The clause is self explanatory. It is required on line side for both incoming as well as outgoing
62	4	VI A	7.2	30	33KV GIS Switchgear	For GIS all access is from the front side thus rear protection for internal arc is not required at site The panel line up can be installed with 500MM gap to the rear wall. and the end covers of the switch board shall block rear access.	Part of detailed design.
63	4	VI A	7.2	30	33KV GIS Switchgear	The VA burden or Instrument Transformers shall be as per the connected load. detailed calculations in support of the same shall be submitted during detail engineering.	Agreed.The same shall be submitted for approval by the contractor.
64	4	VI A	7.2	30	33KV GIS Switchgear	Considering design ambient to be 40Deg C. The rise in temperature shall be governed by IEC.	The same shall be as per IEC.
65	4	VI A	7.2	30	33KV GIS Switchgear	Bus Bar differential protection is not applicable for MV GIS.	Confirmed, Bus Bar Differential protection is not applicable for MV GIS.
66	4	VI A	7.2	30	33KV GIS Switchgear	The bus bar VT / LVT shall be deconnectable type through manual isolatar. Primary fuses in this case are not applicable owing to design.	The Bus Bar VT/LVT shall be as per Vol.-4, Section VI-A, clause 7.2.6.11, Voltage transformers.
67	4	VI B	2.6.3. & 2.6.4	32 & 33 of 154	Bus trunking system shall be provided with two independent earthing GI conductor's size 50x6 (mm) through the length of the system. Effectively connected to the enclosure by riveting /bolting End covers shall be provided as required. 3200 Amps 3P +100% N+ 50% integral	Kindly confirm wether GI conductor's size 50x6 (mm) through the length of the system. OR 50% integral is reuiqred	Please refer Addendum -1 Sr.No.-31
68	4	VI B	2.9.2	48 of 154	Cables shall be fixed to the tray by clamp fabricated from minimum 3 mm thick MS sheets. The Cables shall be dressed properly so as to provide minimum one cable diameter clearance between adjacent cables and from tray ends. Cable trays shall be earthed by 2 runs of 25mm x 3 mm GI strips throughout their lengths.	Kindly confirm that the clamp shall be required only for vertical cable installation on tray. Kindly confirm that 2 runs of 25mm x 3 mm GI strips shall be paid as a separarte item and hence not to be costed in trays.	Clamping shall be applicable for both horizontal and vertical cable installations. BOQ is self explainatory. The earth strip sizing shall be part of detailed design of cable tray and earth strip is covered under separate BOQ item.
69	4	Section 3 – FOT	APPENDIX-1A - SCHEDULE OF KEY DATES	6 of 32	*LD shall be levied @ 0.5% of Contract value for per week delay	There are in total 21 Key dates given in Appendix - 1A. We request that the LD levied against any specific key date shall be paid back / reiumbursed to the contractor once the milestone is complete without affecting overall completion date i.e. 22 months.	Tender conditions prevail
70	4	VI A	2.9.3	49 of 154	HOT DIP GALVANIZING PROCESS FOR MILD STEEL USED FOR EARTHING, CABLE TRAYS OR JUNCTION BOXES FOR ELECTRICAL INSTALLATION Minimum weight of zinc coating for mild steel flats with thickness up to 6 mm in accordance with IS:6745-1972 shall be 400 g/sqm.	Normally zinc quoting around 250 - 280 GSM. Requesting to accept the same	Tender conditions prevail
71	4	VI A	7.1.2.2. k	29-Jan	Impedence Voltage	Impedence Voltage is aksed for 4% wherein as per IS it should be 6.25%, Kindly clarify	Impedence Voltage for the transformer rating shall be as per IS-2026 (Part-5) latest edition.

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72	4	VI A	7		IP Protection	Kindly confirm IP protection for transformenr encloser	The clause is self explainatory. This shall be as per Volume-4, Section VI-A, clause 7.1.2.11 Transformer Cubicle
73	4	VI A	7		Losses	Kindly provided No load losses & Load losses to consider	Please refer Addendum-1 Sr.No. - 26
74	4	VI A	7		Termination Details	Please confim HT & LT side termination details i.e whether cable box or busduct	The clause is self explainatory.
75	4	VI A	7		Tap Changers	Tap Changers shall off ckt tap links, kindly confirm	The clause is self explainatory, it shall be as per Volume-4, Section-vi-a, Clause 7.1.2.2 Auxiliary Transformer Characteristics.
76	5	VI B	2. LT - Tender Drawings		Typical Layouts	Kindly provide Typical Power & Lighting layouts as per list provided.	Part of detailed design
77	6	VI B	E.01.1, r	14 of 270	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from 2 mm thick CRCA sheets with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 65 kA for ASS - I & ASS- II at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.	Panels shall comply IEC61439 or IS 8623 standard. Please clarify. If it is as per IS:8623,what will be form of seperation 3b or 4b.	The clause is self explainatory, it shall be as per Volume-4, Section VI-B, Clause 2.2.4
78	6	Section 3 – FOT	E.01.1	13 of 270	All internal wiring to be FRLS	As per clause No. 2.4.4 of Volume 4, Section VI-B-Electrical -LT : Wiring for CT shall be copper conductor LSZH PVC insulated wires, Please clarify actual requirement.	Wiring for CT shall be copper conductor FRLS insulated wire as per BOQ.
79	6	BOQ	BOQ	49 of 270	q) The panel shall be fitted with fire trace tube system. Scheme of fire trace tube system shall be got approved by Engineer before proceeding with manufacturing and assembly.	Is fire trace tube fitting is in scope of Switchboard manufacturer or only space provision to be made by switchboard manufacturer.	Fire trace tube supply and fixing is in the scope of Switchboard manufacturer.
80	6	BOQ	E 02	49 of 270	In BOQ Dimming control is mentioned wherein Specs nothing is mentioned	Kindly Clarify	Part of detailed design
81	6	BOQ	Depot Fire BOQ: F.02 - 1.8		magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty	For resistive & inductive load MCB with "C" curve is recommended with 5 to10 time rated current and for Motor duty application MCB with "D" curve is recommended with 10 to 20 times rated current because of high starting current. Kindly clarify.	Part of detailed design
82	4 & 6	V1 B & BOQ	2.7 & E 02	37 of 154 & 49 of 270	As per specs sheet steel used in the construction of Distribution Boards shall be 16 gauge CRCA sheets & in BOQ DB'S fabricated from 2 mm thick CRCA	kindly clarify the required thickness of CRCA sheet	Please refer Addendum-1 Sr.No. - 30 (Volume-3, Revised Appendix-28)
83	4 & 6	V1 B & BOQ	2.7 & E 02	37 of 154 & 49 of 270	As per specs MCB is aksed for TPN wherein BOQ ask for 4Pole	Kindly confirm the number poles to consider	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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84	1	Section V- SCC	23	9 of 19	Maintenance during Defects Liability Period : Contractor shall establish an office for the purpose with communication facility so as to facilitate communication for reporting failures and liaison with maintenance staff manning the stations round the clock.	Kindly confirm whether Space, Electricity & Water for office establishment in the station shall be provided by MMRCL.	Tender conditions prevail
85	1	General			Date & Submission of Tender is on 08.09.2017 upto 1800Hrs	Kindly extend bid submission date to 09.10.2017 upto 1800Hrs	Please refer Addendum-1 Sr.No. - 1
86	Volume 1		,Cl No 1.1.3.2	Page No 9 of 125	**(I) At least one "similar work" ** of value of INR 56.0 Crores or more** **Under Similar Works :** E&M works shall be defined as work containing HT&LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the E&M works.	As per qualification criteria, similar work shall be work containnig 60% of electrical component of E&M work We presume electrical value shall be 60% of Rs 56 Cr i.e. 33.6 Cr (in case of one simliar work) and not 60% of our E&M work value. Please confirm.	Please refer Addendum-1 Sr.No. - 2
87	Volume 1		,Cl No 1.1.3.2	Page No 9 of 125	**(I) At least one "similar work" ** of value of INR 56.0 Crores or more** **Under Similar Works:** E&M works shall be defined as work containing HT & LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the E&M works.	As per qualification criteria, similar work shall contain HT & LT electrical, fire suppression & detection and VAC components. We request you to accept following, 1. One work containing 60% of LT electrical work alongwith VAC of required value and 2. separate work for HT electrical work and 3. Separate work for fire detection and supression system of required value. Please confirm.	Please refer Addendum-1 Sr.No. - 3
88	Volume 1		Cl No 1.1.3.2	Page No 9 of 125,	**(I) At least one "similar work" ** of value of INR 56.0 Crores or more** **Under Similar Works:** E&M works shall be defined as work containing HT & LT electrical Fire suppression & Detection and VAC components, out of which electrical component shall be not less than 60% of the E&M works.	As per qualification criteria, similar work shall contain HT & LT electrical, fire suppression & detection and VAC components. We have executed standalone electrical projects containing both HT and LT electrical work, meeting prequalification requirement of electrical work. We request you to accept our credentials for qualification criteria. Please confirm.	Please refer Addendum-1 Sr.No. - 3
89	Volume 2		Cl No-59 and cl No 2.16.1.2	Page No 104 of 131, page no 185 of 593	Additional Clause Safe Custody Bank Guarantee (Applicable for items specifically mentioned in the contract).	We understand this clause is applicable only for DG Set. Please confirm.	Please refer Addendum-1 Sr.No. - 20
90	Volume 4		Cl No 7.1.1 Volume 6 BOQ No B1-3.1, Page no. 22 of 282	Page No 34 of 593,	Auxiliary Transformer power rating of 2000 kVA	As per drawing No-MM3-GC-DEL-GD-08-D09-1002 auxillary transformer rating is 200 KVA 33KV/415V whereas as per specifications and BOQ, it is 2000 KVA, 33KV/433V. Please confirm required rating.	Please refer Addendum-1 Sr.No. - 28
91	Volume 4		,Cl no 7.2.3 & 7.2.5 & Volume 6 BOQ No B1-2.1, Page no. 22 of 282	Page No 37,38 of 593	For GIS switchgear,normal current rating 1250A, Rated short time withstand current 25kA – 1 sec Rated short circuit breaking current 25kA Rated short circuit making current 62.5kA	As per BOQ,GIS panel is rated at (33KV/630Amps/31.5KA/GIS panel) whereas per technical specifications GIS panel is rated at (33KV/1250Amps/25kA/GIS panel). Please confirm the required rating.	Please refer Addendum-1 Sr.No.. 23 (Volume -6, Revised BOQ)
92	Volume 4		Cl no 7.3.3	Page No 46 of 593,	110 V DC Distribution Board The Distribution Boards shall be equipped with sufficient number of circuit breakers which are properly rated to supply the loads in ASS room.	Tender document do not contain single line diagram of DCDB. Please provide SLD for DCDB.	Part of detailed design

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93	Volume 4		,Cl no 2.8.4 ,Cl no 2.16.1.2 Volume 6 BOQ No E-03-1, Page no.171 of 282	Page No 103 of 593 ,Page No 186 of 593	3200 A Copper Flexible End Termination/ Flange Joints	The quantity of copper flexible end termination/ flange joints mentioned in the BOQ for both Transformer and LT panel end is 4 Nos. whereas as per drawing it is 8 Nos. Please confirm required quantity.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
94	Volume 4		Cl no 2.8.4 Cl no 2.16.1.2	Page No 103 of 593, Page No 186 of 593	MV Cables below and upto 25sqmm shall be copper and for sizes above 25sqm shall be Aluminium/ Copper conductor FRLSH, XLPE, insulated, PVC sheathed steel armoured with an outer protective sheath of flame retardant low smoke low halogen (FRLSH) confirming to IS 1554/7098.	1.As per BOQ,it is mentioned "1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables"whereas as per specification it is mentioned FRLSH. Please confirm.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
95	Volume 4		Cl no 2.8.4 Cl no 2.16.1.2	Page No 103 of 593, ,Page No 186 of 593,	MV Cables below and upto 25sqmm shall be copper and for sizes above 25sqm shall be Aluminium/ Copper conductor FRLSH, XLPE, insulated, PVC sheathed steel armoured with an outer protective sheath of flame retardant low smoke low halogen (FRLSH) confirming to IS 1554/7098.	It is mentioned at Cl no-2.16.1.2, Note,All Cables (Power and Control cables) for Elevated stations will be FRLS only. We preesume it is I applicable for cables for DG Set only. Please confirm.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
96	Volume 4		Cl no 2.8.15(iii)	Page No 110 of 593,	iii. Type test on each type of cables, inclusive of measurement of armour DC resistance of power cables	We request you to accept type test certificate of similar type of cables. Please confirm.	Tender conditions prevail
97	Volume 4		Cl No-2.1.3	Page No 81 of 593,	**2.1.3 MCCBs**-Short circuit breaking capacity (Ics) i.e Ics =35 kA up to 250A above and Ics= 50 kA for 400 Amp and above	As per specifiction the description is mentioned as "Ics =35 kA up to 250A and above and Ics= 50 kA for 400 Amp and above" whereas and as per BOQ the description is mentioned as 65KA, Please confirm required rating.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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98	Volume 5			Page No 3 of 7,	Depot Tender Drawing List	The following Drawings from drawing list are not provided in the in tender documents. 1.MM3-GC-DEL-GD-08-D09-1006 -Typical yard & street lighting Aarey Depot R0 Apr-17 2.MM3-GC-DEL-GD-08-D09-1007 -Typical lighting shed 1 R0 Apr-17 3.MM3-GC-DEL-GD-08-D09-1008- Typical lighting shed 2 R0 Apr-17 4.MM3-GC-DEL-GD-08-D09-1009 Typical lighting shed 3 R0 Apr-17 5.MM3-GC-DEL-GD-08-D09-1010 -Maintenance Inspection work shop & central store building lighting ground floor R0 Apr-17 6.MM3-GC-DEL-GD-08-D09-1011 Maintenance Inspection work shop & central store building lighting first floor R0 Apr-17 7.MM3-GC-DEL-GD-08-D09-1012 Typical lighting station basement R0 Apr-17 8.MM3-GC-DEL-GD-08-D09-1013 Typical lighting station concourse R0 Apr-17 9.MM3-GC-DEL-GD-08-D09-1014 Typical lighting station deck level R0 Apr-17 10.MM3-GC-DEL-GD-08-D09-1015 Typical lighting station platform level R0 April 17 11.MM3-GC-DBM-GD-8-D24-0001 BMS System Arthitecture Please provide the above mentioned drawings.	Please refer Addendum-1 Sr.No. - 23
99	Volume 4		Cl no 2.16.2.16	Page No 211 of 593,	List of approved makes	List of approved makes are not provided for following, GIS, Transformer, Busduct, Cables, UPS, Battery charger, Highmast Please provide approved make list for above items.	Please refer Addendum-1 Sr.No. - 30 (Volume-3, Revised Appendix-28)
100	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 1 of 60	b) Water from the underground 2 Nos. RCC Fire Water Storage Tanks, each of 1 lacs litre capacity, shall be supplied for the use of:	As per drawing there are 4nos water reservoir of 100m3 respectively. All required Instruments or equipments have been considered in furnished BOQ.Confirm	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
101	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 9 of 60	vii ,Landing valve shall be single headed SS (Stainless Steel) valve 63mm diameter outlet and 80 mm diameter inlet	Quantity are missing in furnished Bill of material	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
102	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 9 of 60	c: First aid hose reel shall be with 45 mtr long 25 mm dia mtr high pressure thermo plastic (IS: 12585) with ball valve	Quantity are missing in furnished Bill of material	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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103	Volume 6	As per BOQ F02 - FIRE FIGHTING SYSTEM			Line Item 1.3 - RRL fire hose pipe - Qty 272 Line Item 1.4- Branch short pipe - Qty 136 Line Item 1.11- Fabricated 4 mm thick glass door - Qty 31 Line Item 1.12- Hose cabinet fabricated - Qty 100	Fabricated door suitable to accommodate 1 No hydrant landing valves, 1no fire hose reel, 2 Nos.15 m long 63 mm dia hose pipe,1 no branch pipe, 1No. fire man's axe and 2 Nos fire extiguishers. AND Hose Cabinet suitable to accommodate external hydrant with butter fly valve, 2 Nos.15 mtr. Long Hose pipe, 1 No. branch pipe. As per above mentioned Specification & quatity are not match mentioned in Respective Line item 1.3 and 1.4.Please confirm	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
104	Volume 6	As per BOQ F02 - FIRE FIGHTING SYSTEM			Line Item 1.12- Hose cabinet fabricated - Qty 100	Hose Cabinet suitable to accommodate external hydrant with butter fly valve, 2 Nos.15 mtr. Long Hose pipe, 1 No. branch pipe mounted on wall OR raised brick platform 600mm in height built in brick masonary in cement mortat 1:5, 12mm thick plaster on all sides Please clarify said civil scope of work.	Please refer Addendum-1 Sr.No. - 27
105	Volume 6	As per BOQ F02 - FIRE FIGHTING SYSTEM			Line Item 1.11- Fabricated 4 mm thick glass door - Qty 31 Fabricated door suitable to accommodate 1 No hydrant landing valves, 1no fire hose reel, 2 Nos.15 m long 63 mm dia hose pipe,1 no branch pipe, 1No. fire man's axe and 2 Nos fire extinguisher	The required equipment to be accommodated in box, the same have been taken care in furnished BOQ with separate line item. Please confirm	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
106	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 26 of 60	A sprinkler installation shall be fitted with suitable main installation valve to control the water supply to the installation.	Kindly clerify that Installation valve dose not need to be cosnidered?	To be considered as per Technical Specifications.
107	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 28 of 60	The flow switch work at a triggering threshold bandwidth. Flow switch shall be connected with Annunciation panel.	Scope not clear and same are not considered furnish in boq too.	Please refer to clause "4.9. Flow Switch", Volume-4, Section-VI-E Scope of work shall be complete along with Annunciation panel
108	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 29 of 60	Electrically operated alarm shall be provided for indication of operation of sprinkler in area	Scope not clear and same are not considered furnish in boq too.	Please refer to clause"4.13. Annunciation panel and Alarm sprinkler" , Volume-4, Section-VI-E Scope of work shall be complete along with Annunciation panel
109	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 42 of 60	8.3 Approvals FM Approved - Full System Approval (FM) UL Listed - Full System Approval (UL)	Can we offer you FM/UL Listed components ? expect PIPE / Cable .Confirm	Part of detailed design .
110	Volume 6	Section VI-E-FIRE SUPPRESSION		Page No Page 42 of 60	1) Design Concentration specified at for a single largest area. 2) The system design shall be centrised 6) The contractor shall very clearly mention in his offer that he has considered total flooding centralized system with directional valve	Scope not clear. Need to considered Direction valve system or Stand alone system for each area with 100% standby. Also clarify about furnished boq..	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
111	Volume 4 of 6, & Volume 6 of 6	Section VI-A-Electrical -HT & ,Electrical Works-Sub Section - 2 - GIS	Cl:7.2.6.10, Cl:7.2.6.11 , Cl: 7.5.2 & BOQ-S No-B1-2.1	pa g e | 36, P a g e | 40 & Page No 10 of 270	CTs, used for protection and measurement purposes, shall have the appropriate ratio, class and burden in line with the functions they are used for. All current transformers shall have a 3-second short-time current rating of not less than the maximum System fault level. Current transformers shall have an output rating adequate to cater for the burden connected to them and shall function satisfactorily under the maximum system fault condition	Please provide following details for 33 KV GIS, - complete SLD of 33 KV GIS. - CT,PT-ratio,class,Burden. - specify the protections required in the relay, relay protocol,etc - specify the meter details like class, communication	Part of detailed design .PT is required on line side for both incoming as well as outgoing

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112	Volume 4 of 6, & Volume 6 of 6	Section VI-A-Electrical -HT & ,Electrical Works-Sub Section - 2 - GIS	Cl No- 7.2.6.11 & BOQ-S No-B1-2.1	P a g e | 37 & Page No 10 of 270	7.2.6.11 Voltage transformers Voltage transformers of the metal-enclosed encapsulated type are pPlease referred. Other types may be submitted to the Engineer for review and approval. The secondary windings shall be connected to the secondary circuit through a LV fuse or a miniature circuit breaker (MCB). The nominal VT ratio shall be 33kV/110V. The burden of the VT core shall be of 50 VA For protection and measurement applications, the VTs shall be of dual Class 3P/0.5. The burden of VTs shall be decided by the Contractor with a margin of 40% for future additions of instrumentations, and submitted to the Engineer for review and approval.	BOQ do not contain BOQ for PT Panel Where as per technical specifications are Provided for PT panel and PT ratios.Please confirm requirement of PT panel.Also Please confirm if the same is bus or line connected	Tender conditions prevail
113	Volume 6 of 6,	BOQ-E.01-MV Switchgear	BOQ-S No-E.01.1	Page No-12 of 270	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from 2 mm thick CRCA sheets with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 65 kA for ASS - I & ASS- II at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.	As per BOQ specifications,Panels shall comply IEC61349 or IS 8623 standard. Please clarify which standard to be complied. If it is as per IS:8623,what will be form of seperation 3b or 4b. Please confirm.	The clause is self explainatory, it has to be as per Volume-4, Section VI-B, Clause 2.2.4
114	Volume - 4 of 6, & Volume 6 of 6,	Section VI-B-Electrical -LT & BOQ-E.01-MV Switchgear	Cl No-2.1.2 (k) & BOQ-S No-E.01.1	Page 14 of 154 & Page No-12 of 270 and wherever applicable	k) Protection : The true RMS sensing microprocessor based communication upgradeable numerical release with intrinsic RS 485 port for communication by open protocol shall be provided on circuit breaker for offering protection against overload (long time) with adjustable time delay, short circuit (short time) with intentional delay, earth fault protections with intentional time delay & instantaneous protection all with adjustable settings. There shall be LED / LCD display for showing the actual value percentage loading in each phase built in the trip unit. The release shall have an LED/LCD display to show RMS current in all three phases, neutral (4 pole),all energy & power parameters including Maximum demand.	As per BOQ Electrical works & Dwg No-MM3-GC-DEL-GD-08-D09-1003,1004,1005, RS485 Port and Metering Parameters are not asked in any ACB.Only LSIG protection asked in Outgoing ACB.Where as per technical specification RS485 with O/L,S/C & E/F protections.Please clarify actual requirement.	Please refer Addendum-1 Sr.No. - 18 Refe to Volume-6, Clause-1.4.6 for Important Notes related to the works.
115	Volume - 4 of 6, & Volume 6 of 6	Section VI-B-Electrical -LT & ,BOQ-E.01-MV Switchgear	Cl No-2.1.3 & BOQ-S No-E.01	Page 17 of 154 & Page No-15 of 270 and wherever applicable	q) Earth fault protection shall be inbuilt feature of MCCB. For TP MCCBs external Neutral CT shall be provided to avoid nuisance tripping due to unbalance loads.	As per BOQ Electrical works,, MCCB is with variable overcurrent and short circuit releases.If Earth fault protection is required than MCCB with variable overcurrent, short circuit and Earth fault releases has to be selected. Please clarify.	Tender conditions prevail

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116	Volume 4 of 6, & Volume 6 of 6,	Section VI-B-Electrical -LT & BOQ-E.01-MV Switchgear	Cn No-2.4.4 & BOQ-E.01.1, r	Page 27 of 154 & Page No-13 of 270	Wiring for CT shall be copper conductor LSZH PVC insulated wires	As per BOQ ,All internal wiring shall be FRLS where as per technical specification wiring for CT shall be copper conductor LSZH PVC insulated wires. Please clarify actual requirement.	Wiring for CT shall be copper conductor FRLS insulated wire
117	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.4	Page 19 of 154	k) Switchboard panels and cubicles shall be fabricated with CRCA sheet steel of thickness not less than 2mm in general and load bearing members with 2.5mm and shall be folded and braced as necessary to provide a rigid support for all components.The doors and covers shall be fabricated from CRCA sheet steel of thickness not less than 2mm. Joints of any kind in sheet metal shall be seam welded and all welding slag ground off and welding pits wiped smooth with plumber metal.	As per type tested design sheet thickness is 2 mm CRCA. Request to accept all sheet 2 mm CRCA. Please confirm.	Tender conditions prevail
118	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.6 & Cl No- 2.2.2	Page 21 of 154 & Page 19 of 154	k) 25% spare cubicles/ space shall be provided in all switchboards to cater for future use.	As per clause No. 2.2.2 Switch board configuration: The switchboards shall be of adequate size with a provision of 15% spare space to accommodate possible future additional switchgear.where as per Clause No-2.2.6, 25% spare cubicles shall be provided. Please clarify actual requirement.	Details mentioned in Volume-4, Section-VI-B, Clause-2.2.6 shall prevail.
119	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.4	Page 20 of 154	g) The Main distribution panels and sub-main distribution panels are floor standing,meta- clad in Form 4b type with separation panels. These switchboards are designed and manufactured in accordance with IEC61439 standard with IP54 protection. All switchboards shall be 25% spare circuit breakers providing for future loads installation.	As per BOQ, Number of Outgoing ACB/MCCB feeders are clarified.Where as per technical specification 25% more feeders to be added,We understand this clause as the BOQ quantity provided is including 25% more feeders.Please clarify.	The BOQ price is including the cost of 25% future spare requirements. The quantity of spare feeders is to be added as part of detailed design.
120	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.7	Page 21 of 154	a) The maximum current density shall be 1.4 amp per sq.mm. Busbar shall be suitable to withstand the stresses of fault level as specified in schedule of quantities.	Please confirm whether busbars shall be selected as per Type tested design or 1.4 amp per sq.mm of the rating written in technical specification. Also confirm busbar shall be tinned plated or base copper.	Please refer Addendum-1 Sr.No. - 32
121	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.7	Page 21 of 155	b) Bus bars shall be insulated with head shrunk PVC sleeving of 1.1KV grade and bus bar joints provided with clip-on shrouds.	As per technical specification,type tested design PVC heat shrinkable sleeving is not possible. Please calrify requirement.	Tender conditions prevail
122	Volume 4 of 6,	Section VI-B-Electrical -LT	Cl No-2.2.4	Page 20 of 154	e) The switchboard shall be designed for use in high ambient temperature and humid tropical conditions as specified. Ease of inspections, cleaning and repair while maintaining continuity of operation shall be provided in the design.	Ambient temperature and limit for temeperature rise is not defined in tender. Please provide.	Please refer Addendum-1 Sr.No. - 32
123	Volume 6 of 6,	BOQ- 5.2 A	BOQ-S No-5.2.A EPP (INFRASTRUCTURE BUILDING)	Page No-34 of 270	1 no. 250 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-	As per drawing no MM3-GC-DEL-GD-08-D09-1004 ,EPP (INFRSTRUCTURE BUILDING),The rating of the I/C MCCB is 100 Amps.Where as per BOQ it is 250 Amps. Please clarify the actual requirement.	Please refer Addendum-1 Sr.No.- 23 (Volume -6, Revised BOQ)
124	Volume 6 of 6,	BOQ- 5.2 A	BOQ-S No-5.2.A EPP (INFRASTRUCTURE BUILDING)	Page No-34 of 270	3 nos. cast resin current transformers of 250/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.	As per drawing no MM3-GC-DEL-GD-08-D09-1004 the rating of CT is 100/5.Where as per BOQ CT ratio is 250/5.Please clarify actual requiremeent.	Please refer Addendum-1 Sr.No.- 23 (Volume -6, Revised BOQ)

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125	Volume 6 of 6,	BOQ-. 1.11 B	BOQ-. 1.11 B-PASSANGER AMENITIES PANEL (PAP)	Page No-96 of 270	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A **as per specification,** suitable with stand symmetrical fault level of 36kA at 415 V. The neutral busbar is to be of same capacity as phases.	As per drawing no MM3-GC-DEL-GD-D09-1005,The rating of the busbar is 250 Amp where as per BOQ it is 100 A.Please clarify actaul requirement.	Please refer Addendum-1 Sr. No.- 23 (Volume -6, Revised BOQ)
126	Volume 5 of 6,	Dwg -File-Vol_5_Combined_R1_8_12 drawing no MM3-GC-DEL-GD-08-D09-1003			SDB-1 VTPN DB(OCC Building @ Ground Floor) SDB-2 VTPN DB(OCC Building @ Ground Floor)	Drawing shows SLD for SDB-1 VTPN DB and SDB-2 VTPN DB ((Dwg No-MM3-GC-DEL-GD-08-D09-1003,SDB-1 VTPN DB (OCC Building @ Ground Floor),SDB-2 VTPN DB(OCC Building @ Ground Floor)) however same is not provided in BOQ. Please confirm.	Please refer Addendum-1 Sr No.- 23 (Volume -6, Revised BOQ)
127	Volume 6 of 6, & Volume 5 of 6,	BOQ-. 12.1 & Dwg -File-Vol_5_Combined_R1_8_12 drawing no MM3-GC-DEL-GD-08-D09-1004	BOQ-12.1, 630 KVA D.G. SET WITH CANOPY (INCLUDING PLC BASED AMF PANEL)	Page No-71 of 270	INCOMING 1 nos. 1000 A, 50 KA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable 1 nos. 1000 A, 4 pole Power Contactor. (b) OUTGOING (i) 1no. 1000 A, 50 KA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable. (ii) 1no. 630 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable.	As per Dwg No-MM3-GC-DEL-GD-08-D09-1004,630 KVA DG AMF panel is provided with 1000A,4P, ACB as Incomer and 630A,4P MCCB ,400A,4P MCCB as outgoings and no power contactor is shown in drawing,where as per BOQ ratings of outgoing MCCBs are different and also 1000A power contactor is mentioned in the BOQ. Please clarify the purpose of 1000A Power contactor and actual outgoing MCCB requirement.	Please refer Addendum-1 Sr No- 23 (Volume -6, Revised BOQ)
128	Volume 6 of 6,	BOQ-. 12.1.(n)	BOQ-12.1.(n) 630 KVA D.G. SET WITH CANOPY (INCLUDING PLC BASED AMF PANEL)	Page No-72 of 270	Power Pack for the PLC backup of the DG set with all arrangement, including battary, Control Circuits, Internal wiring, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required	1.As per BOQ ,DG Set is provided with power pack for back up.Please clarify Is there any separe power pack (UPS) is required for DG PLC. 2.As per DG manufacturers,they are providing separate controller with DG which could be compatible with PLC through Modbus and RS 485 communication for SCADA. Please confirm. 3.We understand that,AMF Panel shall be provided with PLC Compatible.Please confirm.	Tender conditions prevail
129	Volume 6 of 6, & Volume 5 of 6	BOQ-. 12.1 & ,Dwg -File-Vol_5_Combined_R1_8_12 drawing no MM3-GC-DEL-GD-08-D09-1003	BOQ-12.1, 1000 KVA D.G. SET WITH CANOPY (INCLUDING PLC BASED AMF PANEL)	Page No-54 of 270	(a) Switchgear 1 nos. 1600 A, 50 KA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable 1 nos. 1600 A, 4 pole Power Contactor. (b) 1 No., 230V, AC operated integrated type Digital Multi function meter for measuring Frequency, Amperes ,Voltage, Energy & Power factor of appproved makes conforming to specifications, latest IEC/ EMC and EMI standards, with necessary Circuit MCBs and suitable size CTs for above two incomer metering supporting SCADA / BMS connectivity	As per Dwg No-MM3-GC-DEL-GD-08-D09-1003,1000 KVA DG AMF Panel is not provided with Incoming & Outgoing feeder ratings, where as per BOQ, outgoing feeders are not mentioned in AMF panel. Please provide SLD for AMF Panel.	Drawings and BOQ are self explainatory

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130	Volume 6 of 6, & Volume 5 of 6,	BOQ-. E.09 & Dwg -File-Vol_5_Combined_R1_8_12 drawing no MM3-GC-DEL-GD-08-D09-1005	BOQ-E.09, 500 KVA D.G. SET WITH CANOPY (INCLUDING PLC BASED AMF PANEL)	Page No-109,110 of 270	(a) INCOMING 1 nos. 1000 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable 1 nos. 400 A, 4 pole Power Contactor. (b) OUTGOING 1no. 630 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable. (For Main Distribution panel). 1no. 400 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable. (For Main Distribution panel).	1.As per Dwg No-MM3-GC-DEL-GD-08-D09-1005,DG set rating is 250 KVA DG where as per BOQ it is 500 KVA DG.Please clarify actual rating. 2. As per Dwg No-MM3-GC-DEL-GD-08-D09-1005,AMF Panel provided with 1 No 400A 4P MCCB for Incoming and 2 No's 400A,4P,MCCB for outgoing.where as per BOQ,AMF panel provided with 1 No 1000A,4P MCCB for Incoming and 1 No 630A for outgoing and 1No 400A MCCB for outgoing.Please clarify actual requirement.	Please refer Addendum-1 SR NO- 28 (for Revised drawing)
131	General					Please provide all drawings in Autocad format	The drawings in AUTOCAD format as available shall be provided after award of contract
132	General					Please provide the bank details which required for Bank Guarantee	Tender conditions prevail.Please refer NIT clause 1.1.8 B(ii)
133	Volume 4	Section VI – B-ELECTRICAL - LT - 7.7 33 KV Cables Network of MML-3		Page No. 48	The 33 kV Cables shall conform to IEC 60502-2 and IS-7098	Please confirm whether the cables shall be as per IEC 60502-2 or IS-7098 ?	Tender conditions prevail.
134	Volume 4	Section VI – B-ELECTRICAL - LT - 2.2. LT PANELS – PCC/ MCC/ SUB DISTRIBUTION PANEL		Page No. 83	As per the clause 2.2.1 General (Page No.83) it is mentioned that ACBs as also the switchboard shall be type tested design at CPRI / Independent test house for short circuit, temperature rise and dielectric tests of the ratings required as per BOQ. And as per the clause 2.2.4 Constructional Features (Page No.84) it is mentioned that These switchboards are designed and manufactured in accordance with IEC61439 standard with IP54 protection.	Please confirm whether its Partially Type Tested (CPRI) panels or TTA (OEM) panels	Please refer Addendum-1 Sr.No. - 33
135	Volume 4	Section VI – B-ELECTRICAL - LT - 2.9 Cable Tray		Page No.111	As per the specifications Cable trays shall be earthed by 2 runs of 25mm x 6 mm GI strips throughout their lengths.	We assume that 25mm x 6mm GI strip is considerd in the earthig Section so the cost of 25mm x 6mm GI strip should not be consider in cable tray. Please confirm	BOQ is self explainatory, earth strip sizing shall be part of detailed design.
136	Volume 4	Section VI – B-ELECTRICAL - LT - 2.15 UNITERRUPUTED POWER SUPPLY SYSTEM (UPS)		Page No.172	VRLA Battery System Twin Battery banks supplying 100% rated load suitable for half hour back up with each UPS i.e.two banks of 2 hours backup for a set of UPS over its full service life complete with heavy duty,high discharge valve regulated lead-acid type batteries, battery racks and interconnecting cables shall be provided.	Please confirm which battery bank is to be used from the following 1) Individual Battery Bank on each UPS for 2 Hours (2X100% Redundancy on Battery Setup) 2) Common Battery Bank for both UPS for 2 Hours Back up 3) Individual Battery Bank on each UPS for 1 Hour – Totalling 2 Hours (2x50% Battery Capacity)	Please refer Addendum -1 Sr.No.. 23 (Volume-6, Revised BOQ)

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137	Volume 5	Tender Drawings		Page No.6		We have not received the following drawings kindly provide the same. 01. MM3-GC-DEL-GD-08-D09-1006 02. MM3-GC-DEL-GD-08-D09-1007 03. MM3-GC-DEL-GD-08-D09-1008 04. MM3-GC-DEL-GD-08-D09-1009 05. MM3-GC-DEL-GD-08-D09-1010 06. MM3-GC-DEL-GD-08-D09-1011 07. MM3-GC-DEL-GD-08-D09-1012 08. MM3-GC-DEL-GD-08-D09-1013 09. MM3-GC-DEL-GD-08-D09-1014 10. MM3-GC-DEL-GD-08-D09-1015	Please refer Addendum-1 Sr.No. - 29
138	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - Sub Section-2 GIS		Page No.2	Three way 33kv-GIS. The 33 kV switchgear shall be installed inside auxiliary substations. The ring main units shall be installed on a super-elevated base to permit the entry of 33kV cable at the bottom or alternatively top cable entry may be used. 33 kV GIS shall be SF6 insulated, non-extensible, indoor type with protective relays. (33kv/630amps/31.5kA/GIS panel)	As per this description the fault level should be 31.5 KA but as per the specifications given in vloume 4 page no. 37 the fault level should be 25 KA for 1 sec. Kindly confirm ?	Please refer Addendum-1 Sr.No.. 23 (Volume 6, Revised BOQ)
139	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - Sub Section-3 Transformer		Page No.22	With Please reference to clause - 7.1.2 - Supply, installation, testing & commissioning of indoor type following rating AN type Transformer with copper winding, and +5 to -5% in steps of 2.5%, 33/0.433 KV, 3 phase, 50 Hz, Vector Group Dyn-11 having cable end box on HV side and busbar arrangement on L.T. side with all fittings and accessories, Winding Temperature Indicator, weather proof marshalling box etc. complete as per specifications:-	Kindly provide the level of losses for transformer and we will provide Type Test Report which valid for 5 years. Please confirm ?	Please refer Addendum-1 Sr.No. - 26
140	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.01 MV Switchgear - 8 Feeder Pillar - External Lighting		Page No.52	As per this specifications Feeder Pillar - External Lighting of IP 55 is required	But as per the technical specifications given in the Volume 4 (Page No. 162) the feeder pillar of IP 67 degree of protection is required. Kindly confirm the degree of protection for feeder pillar	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
141	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.01 MV Switchgear -9 APFC Panel		Page No.53		Please confirm which type of capacitors either APP or MPP is to be used.	Clause 2.5- Volume-4, Section VI-B is self explanatory

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142	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.02.Distribution boards		Page No.61	As per Description HDHC tinned copper busbars are requierd for all distribution boards	What does HDHC stands for ? Why HDHC busbars are required? Can we provide normal copper busbars ? Please confirm	Tender conditions prevail.
143	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.03. Distribution Cables - 1.Cable Supply and Laying in cable trays, walls etc & 1.A Cable Supply and Laying in cable trays, walls etc		Page No.66	Cable Supply and Laying in cable trays, walls etc Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables on existing trays / walls/colutnns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.	Please confirm the cost of excavation is be considerED or not ? Because the separate item for excavation is also given (As per E.03 Distribution Cables- 1B Direct buried item for following cable)	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
144	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.03. Distribution Cables - 1.Cable Supply and Laying in cable trays, walls etc & 1.A Cable Supply and Laying in cable trays, walls etc		Page No.66		For Fire Survival Cable we envisage as per BS - 7846. Please confirm ?	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
145	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.03. Distribution Cables - 3 Cable tray & Raceway		Page No.68	"Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays fiom 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below."	As per the specification double bended cable trays are required. Can we provide normal cable trays ? Please confirm	Tender conditions prevail
146	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.04 Conduit Wiring		Page No.68		Please provide detail power and lighting layout in autocad format to workout the length for conduit wiring.	Part of detailed design

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147	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.04. Conduit Wiring - 1 Light and Fan Wiring		Page No.70	Supply, all materials, storing, handling, fixing, laying wiring and testing for light, fan, exhaust fan and 6A Socket points etc starting from the point control box to the point by using 2.5 sq.mm 1100 volts grade FRPVC stranded copper conductor in concealed GI Stove enamelled 16 gauge conduit including 2mm thick GI boxes, fan regulator boxes, together with wiring accessories such as 6A moulded flush mounted modular switches, sockets in boxes of suitable sizes including circuit wiring with 2x2.5 sqmm 1100 volts grade FR PVC insulated stranded copper conductor along with one run of 2.5 sq mm PVC insulated (green colour)	As per this description FRPVC stranded copper conductor is required but as per the descriptions given in the sub points (1.1,1.2,1.3,1.4,1.5,1.6) FRLS PVC stranded copper conductor is required. Kindly confirm FRPVC copper conductor or FRLS PVC copper conuctor is to be used ?	Description in BOQ is self explainatory
148	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.08 Lightning Protection - 2 Copper horizontal & vertical conductor		Page No.80	As per the description SS strips are required	Please confirm wheather SS 304 grade or SS 316 grade is to be used	SS-304 grade shall be used
149	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.11 UNINTERRUPTED POWER SUPPLY SYSTEM		Page No.82		Please confirm the excact quantity for UPS ?	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
150	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.13 OHE ON OFF Indicator		Page No.85		Please provide detail technical specifications for OHE ON OFF Indicator	Part of detailed design.
151	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E.09 DG SET WITH PLC BASED AMF LOGIC PANEL		Page No.243	500 KVA D.G. set with canopy	As per this description the DG set should be of 500 KVA but as per Vol_5_Combined_R1_8_12 (Page No.3) the DG set should be of 250 KVA. Kindly confirm the DG rating ?	Please refer Addendum-1 Sr.No.. 28
152	Volume 6		DEP - VAC H.02	77 of 270	Ventilation System	Requesting you to confirm the scope of electrical works for HVAC equipments. i.e. Electrical Control Panels and Electrical Cabling	Confirmed
153	Volume 6		DEP - VAC H.02	77 of 270	DSITC of axial flow fans	Requesting you to confirm the type of fan to be consider as specification calls for vane axial and BOQ calls for Axial Flow fans	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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154	Volume 6		DEP - VAC H.02	78 of 270	Air Washer	Requesting you to provide the technical specification for Air washer system	Part of detailed design.
155	Volume 6		DEP - VAC H.02	78 of 270	Air Washer	Also requesting you to confirm the scope of piping scope of works for air washer system	The of scope of piping works for air washer system is covered under this contract.
156	Volume 6		DEP - VAC H.02	78 of 270	Wet Scrubber	Requesting you to provide the technical specification for Scrubber	Part of detailed design.
157	Volume 6		DEP - VAC H.03	78 of 270	GI Sheet metal Duct	Requesting you to provide the GSM Coating for GI duct	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
158	Volume 6		DEP - VAC H.03	78 of 270	GI Sheet metal Duct	Can we quote for ducting with TDF flanges	Part of detailed design and as per codes and standards mentioned in clause E 3.2.8.2, Volume-4, Section VI-C.
159	Volume 6		OCC - VAC H.01	57 of 270	Air Cooled Chiller	Requesting you to provide the COP range to be consider	Minimum COP shall be as per ASHRAE - 90.1
160	Volume 6		OCC - VAC H.01	57 of 270	Chiller Plant Manager	Please provide the IO Summary for Plant manager	Part of detailed design
161	Volume 6		OCC - VAC	57 of 270	Primary chilled water pump with VFD	requesting you to clarify the scope of Harmonic distortion across VFD as source level	Please refer clause 3.2.5.3.1 of Volume-4, Section VI-C.
162	Volume 6		OCC - VAC	60 of 270	SITC of air handling unit double skin type (Euro vent certified for mechanical & unit performance)	Do cleint require AHU to be transported in assemble form at site from manufacturer ex-works.	Capacity / rating wise plan shall have to be submitted by the contractor for approval from the Engineer
163	Volume 6		OCC - VAC	60 of 270	Fan Coil Units	FCUs require with secondary drain pan, however we would like to inform the manufacturer provides FCU will Primary drain pan only and secondary drain pan is out sourced and fitted at site	Tender conditions prevail
164	Volume 6		OCC - VAC Item No 1.1	60 of 270	Chilled water piping with insulation	Requesting you to confirm the insulation for piping to be consider as specification calls for Insulation with Nitrile rubber and BOQ calls for insulation with rockwool Requesting you to provide the density and thickness of rockwool insulation to be considered	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
165	Volume 6		OCC - VAC H 05	69 of 270	Chemical Dosing System	Requesting you to provide the water analysis report to be treated	Part of detailed design.
166	Volume 6					FDS System: No make list provided. Kindly share the same.	Please refer Addendum -1 Sr.No. - 30 Volume-3, Appendix-28
167	Volume 6 -		BOQ line item: 18	page 95	Supply, installation, testing and commissioning of Sub alarm panel including the cost of mounting accessories complete as per specifications and as required	FDS SYSTEM: Kindly clear the scope of Sub Alarm Panel (number of loops & location)	BOQ and drawings are self explainatory
168	Volume 6					BMS System: No make list provided.	Please refer Addendum -1 Sr.No. - 30 Volume-3, Appendix-28

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169	Volume 6 -			page 115		BMS system: Kindly share IO summary for the architecture. Please provide detail IO list indicating IOs for Local IO rack (with PLC controller) and IOs for remote IO rack.	Part of detailed design
170						Kindly provide number of following concurrent web remote clients needed for SCADA system. Quantity for web client (machine dependent) & Quantity for viewing only license.	Part of detailed design
171	Volume 6-			page 118	Volume 5-R1_31_46, Page number: 15	Drawing indicates for redundant OFC backbone while similar is not reflected in BOQ. Kindly clear the discrepancy along with scope.	Drawings are self explainatory
172					Volume 5-R1_31_46, Page number: 15	Drawing states for redundancy. Kindly clear the scope of redundancy (Active + Passive Redundancy) or (Active Redundancy) or Passive redundancy. Please clarify.	BOQ is self explainatory
173	Volume 6 -		BOQ LINE ITEM: 7.5 & & 7.7	page 118		BMS System: Kindly share the tank size for level transmitter	Please refer architectural drawings, Volume-5
174	Volume 6 -		BOQ Line item : 7.6	page 118		BMS System: Flow Meter: Kindly share pipe size & flow rates for consideration.	Part of detailed design
175	Volume 6		**1**		Supply, installation testing and comm1ss1oning of fire pumps, electrically driven generally as specified and shown in equipment schedule complete with:	As per Clause no 1.6 of Volume 4 Section VI-E Fire Suppression, Page 4 of 60, Each pump shall be quoted with certain listed accessories. Please confirm whether the same such as Pressure Gauge, Pressure Switch, Butterfly Valves/Sluice valve has been seperately quantified in the BOQ or the same shall be quoted in line item for Pump Itself. Please confirm.	The item in BOQ is inclusive of all subitems as per Technical Specifications
176	Volume 6		**i)**		all accessories	Request you to kindly specify the term accessories. Kindly provide list of Accessories to be considered in the cost of Pump Set	The item in BOQ is inclusive of all subitems as per Technical Specifications
177	Volume 6		**1.1-STATION** **1.22-DEPOT**		**Hydrant & Sprinkler Fire Pumps**	For the subject head and flow,End Suction pumps can been provided. Please confirn whether we can go ahead with End Suction Pump Kindly Confirm the Head. Shall it be 70 Metres or 90 Metres. Pressure Gauge has been separately quantified in the BOQ and same shall be measured and claimed under the subject BOQ Line Item.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
					Supply, installation, testing and commissioning of electrically driven multistage, single outlet high pressure centrifugal type fire hydrant /sprinkler pump, suitable for automatic operation consisting of the following:		
					Horizontal multistage, single outlet, **Split casing** centrifugal pump, suitable for operation on 415 volts± 6%, 3 phase, 50 HZ AC supply. The installation shall be complete with flexible coupling and coupling guard as required. Fire pump shall have CI casing, CS diffusers, bronze impeller (hard finished and dynamically balanced) and SS (304) shaft with mechanical seal, capable for **delivering 2850 LPM at outlet head of70/90 mtrs.** to ensure a minimum pressure of3.5 Kg/Sqcm at the farthest or topmost hydrant / sprinkler. The installation shall be complete with necessary pressure gauge on delivery side.		

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178	Volume 6		**1.2-STATION** **1.23-DEPOT**		Supply, installation, testing and commissioning of **Jockey pump** (pressurisation pump) comprising of the following:	Kindly Confirm the Head. Shall it be 70 Metres or 90 Metres.	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
179	Volume 6				iii) 63 mm synthetic synthetic hoses {UL Listed) with 63 mm instantaneous ss coupling, IS marked- 15 m x 2 lengths with suitable arrangement of connecting the hose pipe with coupling as required.	As per Clause no 2.3, point no d,of Volume 4 Section VI-E Fire Suppression, Page 4 of 60, RRL Hose shall be as per IS. However BOQ Calls for UL Listed Hose. Please confirm the requirement. Also kindly specify the type. Shall it be Type A or Type B.	Please refer Addendum-1 Sr.No..23 (Volume-6, Revised BOQ)
180	Volume 6				iv) branch pipe and nozzle IS marked (Stainless steel)	We understand the same to be short Branch Pipe as per IS 903.	Technical Specifications are self explainatory .It has to be as per codes and standards mentioned in the Technical Specifications . Volume-4, Section VI-E.
181	Volume 6				v) Pressure gauge with stop cock.	Kindly specify the MOC of Casing	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
182	Volume 6		**1.6**		Supply and Installation of Orific Plate complete as required-80 to150 mm Dia.	Kindly provide specific size of Orifice Plate	Part of detailed design
183	Volume 6		**3.1**		Supply, fabricating, laying, testing, painting and commissioning of external piping (UNDERGROUND) generally as specified using heavy class M.S. conforming to 1S1239 with all fittings at a depth of 1.0 Mall complete with one protection layer of 4mm thick Pypkote or similar	Since the Project is Mumbai region, the pipes shall be GI as per Norms by Mumbai Fire Brigade authority. Kindly ammend the MS Black Pipes to MS Galvanised Pipes.	Please refer Addendum-1 Sr.No.. 23 (Volume 6, Revised BOQ)
184	Volume 6		**3.1.1**		200 mm nominal bore	Kindly specify the thickness of pipe.	Please refer Addendum-1 Sr.No.. 23 (Volume 6, Revised BOQ)
185	Volume 6		**3.2**		Excavation and backfilling as per general profiles and back filling for all kinds of soil.	Kindly specify the type of Soil.	Tender conditions prevail.
186	Volume 6		**3.3**		Supply,fixing, testing and commisioning of Butterfly Valves PN 16,with Bronze/Gunmetal seat duly ISi marked with nuts bolts ,washers , Gaskets conforming to IS 13095 ofFollowing size as required.	Kindl specify whether 200 NB and above sizes of Valve shall be gear operated or lever operated. Kindly specify the MOC of Disc shall be SS or Cast Iron.	Tender conditions prevail.However valves up to and including DN150 shall be lever operated and valves in excess of DN150 shall be provided with gear operation.
187	Volume 6		**3.3.10**		100 mm dia gun metal / ss Draw Out connection with foot valve for Fire Brigade.	The MOC of Body shall be Cast Iron. Only the couplings shall be SS or Gun Metal. Please specify the MOC of Coupling. Shall it be SS or Gun Metal.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
188	Volume 6		6-STATION 1.25-DEPT		Providing and fixing **200 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Strainer shall be provided with SS Mesh. Please confirm,	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
189			7-STATION 1.25.1-DEPOT		Providing and fixing **80 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.		Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)

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190	Volume 6		**8**		Supply, installation, testing and commissioning fire brigade connection with 4 way 63mm valves inlets, stand post and 150 mm MS pipe for mounting the stand post etc. as specified all complete as approved . Note:The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Pipe for the same shall be measured and claimed under line item for Pipe quantified in the BOQ.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
191	Volume 6		**11.1**		25 to 40 mm nominal bore	Kindly specify the exact size of Valve.	Part of detailed design
192	Volume 6		F.04 -2(STATION) F.02-1.20(DEPOT)		Providing, fixing, testing and commissioning of UL listed Pendant / Upright type Sprinkler Head rated at 68 degree centigrade	Kindly specify the Response Type. Shall it be Standard Ressponse or Quick response. Kindly specify the K Factor for Sprinklers.	Part of detailed design.
193	Volume 6		3		Providing and fixing sprinkler drain with 25 mm dia ball valve.	We understand the same to be Test and Drain Connection with Sight Glass. Please confirm.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
194	Volume 6		**3-STATION 1.3-DEPOT**		System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	Cabling for the system has not be considered in the BOQ. Request you to kindly provide separate line item for the same to enable us to quote.	Part of detailed design
195	Volume 6		**F.07-STATION F.04-DEPOT**		**FM 200 FIRE SUPPRESSION SYSTEM**	Request you to kindly provide the details of Room Dimensions including details for False Ceiling, False Floor if any. Request you to kindly add line item for Distribution Piping with Pipe sizes and Quantities to enable us to quote.	
196			**A**		**SIGNALLING EQUIPMENT ROOM (SER)**		Please refer architectural drawings, Volume-5
197			**B**		**TELECOM EQUIPMENT ROOM (TER)**		Please refer architectural drawings, Volume-5
198			**C**		**UPS ROOM**		Please refer architectural drawings, Volume-5
199			**D**		**UPS & EM ROOM**		Please refer architectural civil drawings, Volume-5
200			**E**		**STATION CONTROL ROOM (SCR)**		Please refer architectural drawings, Volume-5
201	Volume 6		6		Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Kindly provide quantity for Smoke Detectors and MCP.	Part of detailed design.

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202	Volume 6		**1.2**		The rate shall include supply, laying, jointing and testing of M.S. heavy class pipes conforming to IS: 1239 / 3589 inside building with all accessories like fittings with welded joint 'shall be used like tees, elbows, reducers, flanges, rubber gaskets, GI nuts, bolts, washer and fixing the pipe on floor / wall / ceiling with suitable size clamps, hangers and M.S. pipe sleeve to be provided wherever the pipes are crossing the walls/floors and sealing the sleeves with fire proof material inclosing cutting holes and chases in brick, R.C.C. work and making good the same to original conditions complete in all respects M.S. 'C' heavy class pipe. Pipes upto 150mm dia shall confirm to IS: 1239 and above to IS: 3589. The rate will include all items to complete the work and as per specifications.(For **Above Ground work)**	1)Civil Works such as chasing, chipping, core cutting, making holes in walls and slabs and making good the same shall be done by Civil Contractor. Please confirm. 2)Sleeves are provided during the casting stage and hence providing the same shall not be in our scope. Please confirm. 3)Request you to kindly provide seperate line item for Sealant with Quantity and sizes of Sleeves.	Please refer Addendum-1 Sr.No. - 27
203	Volume 6		**1.3**		Providing & fixing controlled RRL fire hose pipe (as per IS:636) of63 mm dia and 15 meter length rated for brust pressure of 35.7 Kg/sqcm. Hose shall be complete with ISI marked S.S male & female coupling (IS:903) bound & riveted to hose pipe with copper rivets & 1.5 mm copper wire.	Please specify whether the Hose shall be Type A or Type B as per IS 636.	Tender conditions prevail
204	Volume 6		**1.6**		Providing & fixing Gun Metal fire brigade connection unit consisting of 4 No. 63 mm dia instantaneous type male couplings with built-in check valves, 1 No., 150 mm dia flanged outlet complete with bolts, nuts and rubber insertions as required and as per IS standards	Fire Brigade Connection shall be of Cast Iron with Gun Metal Couplings. Please note.	Agreed
205	Volume 6		**1.7**		Providing & fixing Gun Metal fire brigade suction hose coupling (draw-out connection) with nut for female coupling as per IS standards complete with 100 mm dia GI suction pipe and 100 mm dia foot valve (to be connected to static tank). Provision of GI drop pipe and foot valve shall be made in all the fire water static storage tanks (2 No) (GI pipe to be paid separately through appropriate item while cost of foot valve to be included).		Agreed
206	Volume 6		**1.12**		Supplying and fixing of hose cabinet fabricated from of size 900 mm x 600 mm x 450 mm made of 3 mm aluminium sheet with 6 mm thick glazed glass doors i/c necessary locking arrangement suitable to accommodate external hydrant with butter fly valve, 2 Nos.15 mtr. Long Hose pipe, l No. branch pipe, mounted on wall OR raised brick platform 600mm in height built in brick masonary in cement mortat l:5, 12mm thick plaster on all sides and finished with existing/ proposed external finish & duly painted with Post office red externally and white internally with synthetic enamel paint completein all respect, for external hydrants, as required.	Hose Box are generally provided in MS or FRP Material, however the BOQ calls for aluminum Hose Cabinet. Please clarify the requirement. Request you to kindly consider wall or Raised masonary Platform in civil contractor scope.	Tender conditions prevail
207	Volume 6		**1.14**		Providing & fixing butterfly valve tested to a pressure not less than 15 Kg/Sq.cm. Including rubber gasket, flanges, nuts, bolts, washers & painting complete as required.	Kindly confirm 200 NB and above sizes of Valves shall be Gear operated or Lever operated.	Tender conditions prevail.However Valves up to and including DN150 shall be lever operated and valves in excess of DN150 shall be provided with gear operation.

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208	Volume 6		**1.21**		Providing and fixing inspector's test assembly complete with test value, sight glass Sectional drain valve union with corrosion resistant orifice all complete	Kindly specify the Size for Test and Drain Connection.	Part of detailed design
209	Volume 6		**F.05-5**		Snap light emergency evacuation system complete with two high intensity yellow klcolour cyalume lightsticsk (light proof, water proof, wind proof, non explosive, and non toxic) with temper proof pin on a all mounted unit.	Kindly provide detailed Specifications for the same.	Part of detailed design.
210	Volume 6		**F.05-6**		Emergency Combination EYE/ FACE Wash push level and padel operated and Drench Shower - Pull Rod Operated.		
211	Volume 6		2.2 3.2		Providing MS pipes conforming to IS 1239 (Class C) complete with all fittings such as elbows, sockets, tees, unions, reducers, flanges,clamps and plugs etc with threading, jointing and making connections including cutting hole in wall/floor/slaband making good the same with cement concrete **1**:2:4 complete in all respect as per specifications including painting pipe and fittings with two or more coat of synthetic enamel paint of approved quality as per pipe colour over a coat of red oxide primer outside with **1** coat of primer and 2 coats of enamel paint,complete.	Please note that civil works associated such as chasing. Chipping , core cuttimg, making hole in walls and slabs and making good the same shall not be in our scope.	Please refer Addendum-1 Sr.No. - 27
212	Volume 6		B4-2.1(a)		Heavy Lifting bay :15/5 Ton The rate include Design, manufacture, supply, installation, testing and commissioning transportation of 15T/5T EOT Crane for span 30m and bay length 301 m with Main hoist motor along with accessories, Auxiliary hoist motor along with accessories, and long/cross travel motors along with accessories. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. I)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	As per Heading of APPENDIX 1 – TECHNICAL PARAMETERES of Volume-4 Employer Requirement Technical Specification Section VI-G-EOT Crane, the capacity of EOT mentioned is 15/3T however BOQ calls for 15/5T EOT and also in the same datasheet, the speed mentioned is for 15T and 2T Hoist. Please confirm the capacity of EOT along with Respective speeds for the same.	Please refer Addendum-1 Sr.No. - 24

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213	Volume 6				Heavy Lifting bay :5/2 Ton The rate include Design, manufacture, supply, installation, testing and commissioning of 5T/2T EOT Crane for span 30 m, and bay length 30 I m with Main hoist motor along with accessories, Auxiliary hoist motor along with accessories, and long/cross travel motors along with accessories. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. I)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	In the datasheet as per APPENDIX 1 – TECHNICAL PARAMETERES of Volume-4 Employer Requirement Technical Specification Section VI-G-EOT Crane, the Hoist speed for capacities has not been specified, kindly specify the same.	Please refer Addendum-1 Sr.No. - 24
214	Volume 4	Section VI – B	ELECTRICAL - LT - 7.7 33 KV Cables Network of MML-3	Page No. 48		Please confirm whether the cables shall be as per IEC 60502-2 or IS-7098 ?	Refered Section and clause are irrelevant HT cables shall be as per Volume-4, Section VI-A, Clause 7.7.2
215	Volume 6	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E02-DISTRIBUTION BOARD			As per technical specification construction of DB shall be 16 guage (1.6mm thick) CRCA sheet and in BOQ discription given 2mm thick CRCA. Please confirm thikness of DB.	Please refer Addendum-1 Sr.No. - 25
216	Volume 6	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E10-BUSDUCT			As per specification enclosure shall be 1.6mm thick sheet steel and in BOQ discription given 14SWG (2mm thick). Please confirm it.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
217	Volume 6	Volume 6	2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - E05 - INDOOR LIGHTING AND FANS			Please confirm weather we need to quote as per BOQ description or Catalogue number, as there is descrepancy in between Catalogue number and BOQ description.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
218	**Schedule of Electrical Bill Of Quantity**	**Volume 6**	**2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 270 - B1 - ELECTRICAL WORKS - GIS**			**Please find below cooments received from one of the manufacturer. We request you to clarify the same.**	**NA**
219	Section VI-B-Electrical -LT	Schedule of Electrical Bill Of Quantity	E.01.1			Panels shall comply IEC61349 or IS 8623 standard. Please clarify. If it is as per IS:8623,what will be form of seperation 3b or 4b.	Tender conditions prevail . Please refer Volume-4, Section VI-B, Clause 2.2.4
220	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.1.2 Air Circuit Breakers			In Schedule of Electrical Bill Of Quantity, RS485 Port is not asked in any ACB. Not any metering parameters asked, only LSIG protection asked in Outgoing ACB. So BOQ and specifications are not matching. Please conform actual requirement.	Tender conditions prevail

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221	Schedule of Electrical Bill Of Quantity	Section VI-B-Electrical -LT	2.1.3 MCCBs.			In Schedule of Electrical Bill Of Quantity, MCCB asked only with variable overcurrent and short circuit releases. No MCCB available in market which has inbuilt feature for Earth fault protection. If Earth fault protection is required than MCCB with variable overcurrent, short circuit and Earth fault releases has to be selected. Please clarify.	Tender conditions prevail
222	Section VI-B-Electrical -LT	Schedule of Electrical Bill Of Quantity	E.01.1, r			As per clause No. 2.4.4 of Volume 4, Section VI-B-Electrical -LT : Wiring for CT shall be copper conductor LSZH PVC insulated wires, Please clarify actual requirement.	Wiring for CT shall be copper conductor FRLS insulated wire
223	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.2.4 CONSTRUCTIONAL FEATURES			As per type tested design sheet thickness is 2 mm CRCA. Request to accept all sheet 2 mm CRCA.	Tender conditions prevail
224	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.2.6 SWITCHBOARD COMPARTMENTALIZATION			As per clause No. 2.2.2 of Volume 4, Section VI-B-Electrical -LT SWITCH BOARD CONFIGURATION : The switchboards shall be of adequate size with a provision of 15% spare space toaccommodate possible future additional switchgear. Please confirm actual requirement.	Details mentioned in Volume-4, Section-VI-B, Clause-2.2.6 shall prevail.
225	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.2.4 CONSTRUCTIONAL FEATURES			Number of Outgoing ACB/MCCB is clarified in BOQ, so Please Please confirm whether 25% more feeders to be added over BOQ quantities written in Switchboard BOQ.	The BOQ price is including the cost of 25% future spare requiements.The quantity of spare feeders is to be added as part of detailed design.
226	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.2.7 SWITCHBOARD BUS BARS			Please confirm whether busbars shall be selected as per Type tested design or 1.4 amp per sq.mm of the rating written in BOQ. Also confirm busbar shall be Tinned plated or base copper.	Please refer Addendum-1 Sr.No. - 32
227	Section VI-B-Electrical -LT	Section VI-B-Electrical -LT	2.2.7 SWITCHBOARD BUS BARS			As per type tested design PVC heat srincable sleeving is not possible, request to delete it.	Tender conditions prevail
228	Schedule of Electrical Bill Of Quantity	Section VI-B-Electrical -LT	2.2.4 CONSTRUCTIONAL FEATURES			Ambient temperature and limited of Temeperature rise is not defined in tender, kinldy clarify.	Please refer Addendum-1 Sr.No. - 32
229	Section VI – A	Schedule of Electrical Bill Of Quantity	E.01.1			Is fire trace tube fitting is in scope of Switchboard manufacturer or only space provision to be made by switchboard manufacturer.	Fire trace tube supply and fixing is in the scope of Switchboard manufacturer.
230	Section VI – A Electrical HT- GIS	Section VI – A	ELECTRICAL - HT - 7.2.6.3 GIS- Switchgear Interlocking			As per manufacture interlock key feature is NA for GIS, sience interlock between CB & ISD as standard available in both mechanical and electrical.	Tender conditions prevail
231	Section VI – A Electrical HT- GIS	Section VI – A Electrical HT- GIS	Short Time Rating			Please confirm if it is 25kA 1 sec or 31.5kA 1 sec since it is different in the specification & BOQ	Please refer Addendum -1 Sr.No.-23 (Volume-6, Revised BOQ)
232	Section VI – A Electrical HT- GIS	Section VI – A Electrical HT- GIS	Cable Entry for power & control cables			Please confirm if it is bottom or top since it is different in the specification & BOQ	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)
233	Section VI – A Electrical HT- GIS	Section VI – A Electrical HT- GIS	Current Rating			Please confirm the current rating-630 or 1250 A since it is different in the specification & BOQ	Please refer Addendum-1 Sr.No. - 23 (Volume-6, Revised BOQ)

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234	Section VI – A Electrical HT- GIS	Section VI – A Electrical HT- GIS	PT Panel			Please confirm if PT panel is required.Also Please confirm if the same is bus or line connected	Clause is self explanatory. It is required on line side for both incoming as well as outgoing
235	Volume 4	Section VI – A Electrical HT- GIS	CT,PT,Relay,Meter			Please mention the CT,PT-ratio,class,Burden.Please also specify the protections required in the relay,relay protocol,etc.Please also specify the meter details like class,communication	Part of detailed design.
236	General	2.2,Access to and Possession of the site			The employer shall grant the Contractor right of access to, and/ or possession of the Site progressively for the completion of works. Such right and possession may not be exclusive to the Contractor.	The time frame within which such access to and complete possession of the site shall be handed over to the Contractor to be specified.	Tender conditions prevail
237	General	4.4, Facilities for and Coordination with others, (C)			The Contractor shall provide within the site, staging, storage and unloding areas for the use of Designated Contractor, if any, who are undertaking track work, fare collation system, supply, testin and commissioning of rolling stock, escalators, lifts, signalling and telecommunication and traction power installation work,etc.	There are provisions in the GCC which sesms not relevant to the scope of works. Please seek calrification	Tender conditions prevail
238	General	SCC			There will be no objection if conciliator so nominated is a serving employer of MMRC	We suggest deletion of this provision as the Conciliator should not be associated with any of the Parties.	Please refer Addendum-1 Sr.No. -19
239	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 1 - Pumps for (Drinking Water Pump Depot) (Drinking Water Pump OCC pump room to Overhead tank)			Bronze impeller is reflected in boq & technical specification. As per approve makes- SS impeller (SS 304) is available instead of bronze. Hence Please confirm the SS impeller for this item.	Tender conditions prevail
240	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 2 - Transfer pumps (Pump room to Auto coach washing plant) Sr.No. 3 - Transfer pumps (Pump room to Emergency repair / Inspection Bay) Sr.No. 4 - Filter feed pumps to WTP Sr.No. 5 Pumps - Main STP Outlet Pump for all buildings Irrigation Pumps from ETP/STP pump room			1) Please confirm Centerifugal pump (Horizontal or Vertical lnline). 2) Control panel Details missing, Please share the same.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)

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241	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 6 A- non clog type mono block submersible drainage pumps - Ancillary Sump Pump Capacity (Location: Depot) Sr.No. 6 B- non clog type mono block submersible drainage pumps - Ancillary Sump Pump Capacity(Location: OCC) Sr.No. 6 C - (Location: Lift pit)			1) Can we quote for the pump which is having 10 mm particle size handling capacity against 12 mm in BOQ. 2) Control panel Details missing, Please share the same. 3) Please specify working & stand by requirement for item C	Tender conditions prevail
242	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 7			1) Please speify make for level controller. 2) Please specify quantity , sizes & unit for wiring and conduiting for proper estimation.	1) Please refer Addendum -1 ,Sr.No. 30 2) Tender conditions prevail
243	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 8 single / multistage submersible tubewell pump			NORYL impeller is reflected in boq. As per approve makes- SS impeller (SS 304) is available instead of NORYL impeller in BOQ. 1) Hence Please confirm the SS impeller for this item. 2) Please specify working & stand by requirement	1) Tender conditions prevail 2) No stand by is required
244	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 15 dust and vermin proof motor control panel			Please proived SLD of control panel	Part of detailed design.
245	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey Depot**	Sr.No. 16			1) Please confirm Centerifugal pump (Horizontal or Vertical lnline). 2) Please confirm the application of pump & required Head in meter. 3) Kindly clarify whether requirement is submersible or direct coupled (surface mounted pumps)	1) Horizontal Inline 2) for transfer of drain water to STP/ETP head is 12 m 3) Type of pump is part of detailed design
246	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.1 Water transfer Pumps			In Boq, Head is reflected SOM. Is this typo writing mistake ie. 50 M head	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
247	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.2 non clog type mono block submersible drainage pumps			1) Can we quote for the pump which is having 10 mm particle size handling capacity against 12 mm in BOQ. 2) Please specify working & stand by requirement for item C	Tender conditions prevail

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248	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.3 Construction of bore well			Please provide the drawing of the proposed Rainwater Harvesting System so as to clarify the locations and applications of the listed components. What is the sub Stratum	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
249	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.3 Construction of bore well			Is the borewell Point finalized as per the hydro geological survey?	Part of detailed design however for Geological Survey requirements the contractor is to interface with civil contractor
250	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.3 MS Pipes,Strainer Pipes			1) What are the expected locations and applications of the MS Pipes,Strainer Pipes. 2) Is the Rainy V-Wire Screen can be used which is optimum in size and cost.	Part of detailed design
251	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.3 Pea gravel			Please specify size of Pea gravel What is annular space between the borehole & ube well assembly which shall be packed with pea gravel.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
252	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.3 air compressor			Is the Supply & installation of air compressor in this item ? If Yes , then Please provide us details for air compressor.	Tender conditions prevail
253	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.4 single / multistage submersible tubewell pump			NORYL impeller is reflected in boq. As per approve makes- SS impeller (SS 304) is available instead of NORYL impeller in BOQ. Hence Please confirm the SS impeller for this item.	Tender conditions prevail
254	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.6 dust and vermin proof motor control panel			Please proived SLD of control panel	Part of detailed design
255	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.7			Please MOC of tail plug	Part of detailed design
256	Volume - 6	Schedule of BILL OF QUANTITIES (CIVIL - PLUMBING) - **Aarey station**	Sr.No. 1.8			Please speify make for level controller. Please specify quantity , sizes & unit for wiring and conduiting for proper estimation.	1) Please refer Addendum -1 ,Sr.No. 30 2) Tender conditions prevail
257	Volume 1	Section I	1.1.3.2			Please consider E&M projects for private client	Tender conditions prevail
258	Volume 1	NIT	Cl;1.1.3	Page 3 of 10	JV / Consortium	Please confirm max. number of member allowed in JV/ (	Tender conditions prevail

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259	Volume 1	NIT	Cl;1.1.4 .(ii) Tender sccurity amount.		In case of JV/ Consortium. Bank guarantee of tender security shall be in the name of JV/ Consortium	We request you to accept , BG drawn by and in thhe name of any of th JV member, Normaly bank dose not allow to incorporate name of agencies othe than the account holderm in the BG	Tender conditions prevail
260	Voluem 1	NIT	Cl: 1.1.3.2 Minimum Eligibility Criteria A: General Experience		At least one Similar work---------- of the E&M Work.	We request you to accept the value of similar work completed for the total contract (Largee Contract) intead of E&M work only. (Similar Work)	Tender conditions prevail
261	Volume 1	NIT	Cl: 1.1.3.2 Minimum Eligibility Criteria A: General Experience	Page 04 of 10	In case of work(s) listed under A …the tender should have excecuted any othhe work containing VAC of value Rs. 4.0 Croes or more……. … the tender should have executed any other work containing Fire and Hydraulics system of Value Rs. 4.0 Croer or more.....	We request you to accept the experience of similat work completion of any value, for bothe the works.	Tender conditions prevail
262		General			Impact of GST	Since the estimate of the tender is based on prevailing tax structure, befor inlication of GST, Please confirm whether the estimated rates shall be Revised of GST will be paid Extra. Pl Confirm.	No revision of estimate will be done. Tender conditions prevail
263						We hereby request you to extend the last date of submission by minium 20 days	Extended. Please refer Sr. No.01 of Addendum 1
264	Volume- 4 Technical Specification	Section VI-A-Electrical -HT	Clause 7.2		**33 kV GIS Switchgear:** The switchgear shall be of the single bus bar indoor metal-enclosed extendable type, which shall form a complete switchgear.	As per BOQ the switchgear shall be indoor type metal enclosed non extensible, But the speciciation asks for extensible type. Please confirm the same.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
265	Volume- 4 Technical Specification	Section VI-A-Electrical -HT	Clause 7.2		Electrical characteristics for the 33 kV GIS panel are furnished below. The current ratings will be verified by the Contractor. Rated voltage 36 kV Operation voltage 33 kV+ Frequency 50 Hz Rated bus bar current 1250A Rated current of feeders: 1250A Rated current of transformer feeders 1250 A Rated short time withstand current 25kA – 1 sec Rated short circuit breaking current 25kA Rated short circuit making current 62.5kA Lightning impulse test (BIL) voltage 170 kV peak Power frequency test voltage 70 kV rms Auxiliary Supply Voltage 110V DC Degree of Protection (HV Compartment) IP65 Degree of Protection (LV Compartment) IP3X	Please confirm the circuit breaker rating and rated short circuit breaking current shall be as per BOQ or as per technical specification.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)

MUMBAI METRO RAIL CORPORATION LIMITED Mumbai Metro Line-3 Project Response to Bidder's Queries on Volumes 1 to Volume-6 for Contract No. MM3-CBS-DEM Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"							MMRC'S RESPONSE / CLARIFICATION dated 6th September 2017
Sr. No.	**Volume**	**Section**	**CLAUSE No. / Sub Head / BOQ Sr.No.**	**PAGE No.**	**Relevant Abstract from Tender**	**Bidder's Queries**	**MMRC'S RESPONSE**
266	Volume- 4 Technical Specification	Section VI-A- Electrical -HT	Clause 6.3		General Requirements 6.3.1 Internal equipment The ASS room equipment arrangement shall be detailed and designed to accommodate the following equipment and facilities: a. 33 kV GIS Switchgear b. Auxiliary transformers 33 kV/433 V c. Low voltage distribution cubicles (AC and DC) d. Battery & Battery Charger e. Control rooms f. Control and Relay panels	The 33KV GIS, Transformer and ther substion equipment shall be housed in ASS rooms. Please confirm the housing of such equipments shall be in the scope of civil contractor.	Tender conditions prevail
267	Volume- 6 BOQ	Sub Section - 4 -HT Cables			Supply of 33 KV, 1C per phase x 120 Sq. mm XLPE Copper cable Earthed armoured HT cable in cable trenches with cover complete as required.	The laying of 33KV HT cable in cable trench. Please confirm the making of trench shall be in the scope of civil contractor.	Confirmed
268	Volume- 4 Technical Specification	Section VI-B- Electrical -LT	Clause 2.6.3		**BusDuct (Sandwich Type)** Supply installation, testing & commissioning of the following totally enclosed, dust and vermin proof Low impedance compact sandwich bus duct: Ingress protection IP 55 Indoor mounts 14 SWG sheet steel clad Electrolytic Grade Cupper(Cu.) bus bar Operation at 415 Volt 3 phase 50 Hz system Insulation voltage 1000 volts Fault withstand 65 kA symmetrical for 1 second	Please confirm the BusDuct enclosure thickness and IP shall be 14 SWG and IP 55 resp. as per BOQ or shall be 16 SWG and IP 54 as per technical Specification,	Please refer Addendum-1 Sr.No..31
269	Volume-3- Employer's Requirement General Specification	Appendix -28- List of Approved manufactures			There are currently no approved manufacturers and suppliers for the MML-3 Project.	In order to quote competetive bid we need the approved manufacturer / Suppliers list, that can be reasonably compared for the contract. Please confirm.	Please refer Addendum -1 Sr.No. 30 Volume -3, Appendix -28
270	Volume 2- Condition of Contract and Contract Forms	Section V- SCC- Sub Clause	11.2.1		Mobilisation advance shall be equal to 5% of the contract value. The advance shall be paid in two instalments of 2.5% each. In Design & Build Contracts, the second instalment will be paid after approval of Definitive design and acceptance of prototype test.	We request for the following payment terms: 1. 10% interest free mobalization advance for the project. 2. 60% supply of material on delivery and acceptance at site. 3. 20% Installation and acceptance. 4. 10% Testing, commisioning and Handing over.	Tender conditions prevail
271					The work, executed for private client will not be considered for eligibility evaluation.	In recently floated tender by MMRCL "CONTRACT NO: -MM3-CBS-REL-PYL" there was a condition that "In case the work is executedfor private client, copy of work order, bill ofquantities, bill wise details ofpayments received certified by CA., TD.S certificates for all payments received and copy of final/last bill paid by client shall also be submitted" . Hence request you to kindly accept the work executed for the private client for the evaluation on the grounds of previous tender called by MMRCL for MML-3 Depot/yard at Aarey colony.	Tender conditions prevail

MUMBAI METRO RAIL CORPORATION LIMITED Mumbai Metro Line-3 Project Response to Bidder's Queries on Volumes 1 to Volume-6 for Contract No. MM3-CBS-DEM Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"							MMRC'S RESPONSE / CLARIFICATION dated 6th September 2017
Sr. No.	**Volume**	**Section**	**CLAUSE No. / Sub Head / BOQ Sr.No.**	**PAGE No.**	**Relevant Abstract from Tender**	**Bidder's Queries**	**MMRC'S RESPONSE**
272					For completed works, value of work done shall be updated to 31.03.2017 assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year. The exchange rate of foreign currency shall be applicable 28 days before the submission date of tender.	Please clarify whether the 5% inflation for Indian Rupees Every year applies for Design, Supply, Installation, Testing and Commissioning of VAC work component of Large Complex/ Metro Station/ Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/ Airport/ hospital buildings I Industrial establishment of value Rs. 4.0 Crores or more. AND Design, Supply , Installation, Testing and Commissioning of Fire and Hydraulics System of Large Complex/Metro Station/Mass Rapid Transit System/ Commercial Buildings/ Official Buildings/ Railway Stations/Airport/hospital buildings/ industrial establishment of value Rs. 4.0 Crores or more.	Tender conditions prevail
273						Kindly extend the tender submission date by another 10 days	Extended. Please refer Sr. No.01 of Addendum 1
274						With Please reference to the above subject we would like to highlight the following clarification for our further working. 1. As per our completion certificate, we have completed the following jobs a) MSEDCL Infrastructure Projects of 69.928Cr and 109.93Cr. b) Construction of Hospital, OPD & other Associate works for proposed Kalpana Chawla Government Medical College at Kamal Haryana of 41Cr. c) Execution of Electrical works at Jawaharlal Nehru Port Trust (JNPT), Navi Mumbai of 30Cr. d) Supply, Installation Testing and Commissioning of Electrical systems of Antilia (A prestigious high rise in Mumbai for Reliance Engineering Associate Pvt. Ltd.) For a total value of 30Cr. e) MMRDA new office building Electrical/ HVAC/ IBMS Systems works for 18Cr having HVAC work more than 4Cr. Please conform the eligibility for qualification as per above mentioned projects.	Tender conditions prevail
275						2. Please conform the civil scope for HT Cable Trench with cover.	It is confirmed that the cable trench for 33KV cables is in the scope of civil contractor.
276						3. In Section-5-DCDB with Battery Charger consists of 1 set of 110v DC Battery and 2nos of Battery Charger. Please conform the quantity of Battery Charger is one or two.	Clause in Section-5-DCDB is self explainatory
277						4. In LDB and PDB Section, we have considered standard DB. Please conform.	Tender conditions prevail

MUMBAI METRO RAIL CORPORATION LIMITED Mumbai Metro Line-3 Project Response to Bidder's Queries on Volumes 1 to Volume-6 for Contract No. MM3-CBS-DEM Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"							MMRC'S RESPONSE / CLARIFICATION dated 6th September 2017
Sr. No.	**Volume**	**Section**	**CLAUSE No. / Sub Head / BOQ Sr.No.**	**PAGE No.**	**Relevant Abstract from Tender**	**Bidder's Queries**	**MMRC'S RESPONSE**
278						5. In cable laying Section 1.A, Please conform the following cables are Fire survival. a) 4C X 95 Sqmm AL Cable b) 4C X 10 Sqmm CU Cable c) 4C X 6 Sqmm CU Cable	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
279						6. For cable Section-1, we have not considered excavation and backfilling with sand and bricks as the same is given in separate item 1.B. Please conform.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
280						7. The minimum support height of the tray is 1mtr below ceiling. Please conform.	Part of detailed design
281						8. For item no E-1.3, for ceiling fan point we have considered all points as point irrespective of primary and secondary .	Primary points only are to be considered
282						9. For item no E-1.4, for Air circular fan point, we have considered all points as point irrespective of primary and secondary .	Primary points only are to be considered
283						10. For point wiring Section 1.6.6 and 1.6.7, for 3ph 32A and 63A industrial switch socket, 50 GI conduit as mentioned in BOQ is not suitable for entry inside the back box which can be changed to 32mm dia GI conduit. Please conform.	Tender conditions prevail
284						11. Please conform the requirement of item no 2.1 to 2.7 as the same switch socket is considered in in point wiring Section.	Please refer Addendum-1 Sr.No.. 23 (Volume-6, Revised BOQ)
285						12. Please share the make list for OHE ON OFF indicator Section.	Part of detailed design.
286						13. Please conform the scope of work for civil foundation of EOT crane.	Tender conditions prevail
287						14. Please share the make list of LT Section.	Please refer Addendum-1 Sr.No.- 30, Volume-3, APPENDIX-28
288						REQUEST TO EXTEND THE TENDER SUBMISSION DATE UPTO - 08-10-2017	Extended. Please refer Sr. No.01 of Addendum 1
289						REQUEST TO EXTEND THE TENDER SUBMISSION DATE UPTO - 04-09-2017	Extended. Please refer Sr. No.01 of Addendum 1
290						Kindly extend the bid submission date by 2 weeks i.e till 22nd September 2017	Extended. Please refer Sr. No.1 of Addendum 1

Attachment-1 to Addendum-1

No. P-45021/2/2017-B.E.-II
Government of India
Ministry of Commerce and Industry
Department of Industrial Policy and Promotion
****

Dated 15th June, 2017
Udyog Bhawan, New Delhi

To

All Central Ministries/Departments/CPSUs/All concerned

ORDER

Subject: Public Procurement (Preference to Make in India), Order 2017

Whereas it is the policy of the Government of India to encourage 'Make in India' and promote manufacturing and production of goods and services in India with a view to enhancing income and employment, and

Whereas procurement by the Government is substantial in amount and can contribute towards this policy objective, and

Whereas local content can be increased through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them,

Now therefore the following Order is issued :

1. This Order is issued pursuant to Rule 153 (iii) of the General Financial Rules 2017.

2. **Definitions** For the purposes of this Order:

   'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

   'Local supplier' means a supplier or service provider whose product or service offered for procurement meets the minimum local content as prescribed under this Order or by the competent Ministries / Departments in pursuance of this order.

   'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

   'margin of purchase preference' means the maximum extent to which the price quoted by a local supplier may be above the L1 for the purpose of purchase preference.

   'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services.

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'*Procuring entity*' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

3. **Requirement of Purchase Preference**: Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to local suppliers in all procurements undertaken by procuring entities in the manner specified hereunder:

   a. In procurement of goods in respect of which the Nodal Ministry has communicated that there is sufficient local capacity and local competition, and where the estimated value of procurement is Rs. 50 lakhs or less, only local suppliers shall be eligible. If the estimated value of procurement of such goods is more than Rs. 50 lakhs, the provisions of sub-paragraph b or c, as the case may be, shall apply.

   b. In the procurements of goods which are not covered by paragraph 3a and which are divisible in nature, the following procedure shall be followed:

      i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a local supplier, the contract for full quantity will be awarded to L1.

      ii. If L1 bid is not from a local supplier, 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the local suppliers, will be invited to match the L1 price for the remaining 50% quantity subject to the local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such local supplier subject to matching the L1 price. In case such lowest eligible local supplier fails to match the L1 price or accepts less than the offered quantity, the next higher local supplier within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on local suppliers, then such balance quantity may also be ordered on the L1 bidder.

   c. In procurements of goods not covered by sub-paragraph 3a and which are not divisible, and in procurement of services where the bid is evaluated on price alone, the following procedure shall be followed:

      i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a local supplier, the contract will be awarded to L1.

      ii. If L1 is not from a local supplier, the lowest bidder among the local suppliers, will be invited to match the L1 price subject to local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such local supplier subject to matching the L1 price.

      iii. In case such lowest eligible local supplier fails to match the L1 price, the local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference matches the L1 price, then the contract may be awarded to the L1 bidder.

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Attachment-1 to Addendum-1

4 Exemption of small purchases: Notwithstanding anything contained in paragraph 3, procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

5 Minimum local content: The minimum local content shall ordinarily be 50%. The Nodal Ministry may prescribe a higher or lower percentage in respect of any particular item and may also prescribe the manner of calculation of local content.

6 Margin of Purchase Preference: The margin of purchase preference shall be 20%.

7 Requirement for specification in advance: The minimum local content, the margin of purchase preference and the procedure for preference to Make in India shall be specified in the notice inviting tenders or other form of procurement solicitation and shall not be varied during a particular procurement transaction.

8 Government E-marketplace: In respect of procurement through the Government E-marketplace (GeM) shall, as far as possible, specifically mark the items which meet the minimum local content while registering the item for display, and shall, wherever feasible, make provision for automated comparison with purchase preference and without purchase preference and for obtaining consent of the local supplier in those cases where purchase preference is to be exercised.

9 Verification of local content

a The local supplier at the time of tender, bidding or solicitation shall be required to provide self-certification that the item offered meets the minimum local content and shall give details of the location(s) at which the local value addition is made.

b In cases of procurement for a value in excess of Rs. 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

c. Decisions on complaints relating to implementation of this Order shall be taken by the competent authority which is empowered to look into procurement-related complaints relating to the procuring entity.

d. Nodal Ministries may constitute committees with internal and external experts for independent verification of self-declarations and auditor's/ accountant's certificates on random basis and in the case of complaints.

e. Nodal Ministries and procuring entities may prescribe fees for such complaints.

f False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

g. A supplier who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the

Contd.p 4/-

duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, in the manner prescribed under paragraph 9h below.

h. The Department of Expenditure shall issue suitable instructions for the effective and smooth operation of this process, so that:

i. The fact and duration of debarment for violation of this Order by any procuring entity are promptly brought to the notice of the Member-Convenor of the Standing Committee and the Department of Expenditure through the concerned Ministry /Department or in some other manner.

ii. on a periodical basis such cases are consolidated and a centralized list or decentralized lists of such suppliers with the period of debarment is maintained and displayed on website(s).

iii. in respect of procuring entities other than the one which has carried out the debarment the debarment takes effect prospectively from the date of uploading on the website(s) in the such a manner that ongoing procurements are not disrupted.

10 Specifications in Tenders and other procurement solicitations:

a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.

b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of local suppliers who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.

c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.

d. If a Nodal Ministry is satisfied that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, it may, if it deems appropriate, restrict or exclude bidders from that country from eligibility for procurement of that item and/ or other items relating to that Nodal Ministry. A copy of every instruction or decision taken in this regard shall be sent to the Chairman of the Standing Committee.

e. For the purpose of sub-paragraph 10 d above, a supplier or bidder shall be considered to be from a country if (i) the entity is incorporated in that country, or ii) a majority of its shareholding or effective control of the entity is exercised from that country; or (iii) more that 50% of the value of the item being supplied has been added in that country. Indian suppliers shall mean those entities which meet any of these tests with respect to India."

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Attachment-1 to Addendum-1

11. **Assessment of supply base by Nodal Ministries**: The Nodal Ministry shall keep in view the domestic manufacturing / supply base and assess the available capacity and the extent of local competition while identifying items and prescribing minimum local content or the manner of its calculation, with a view to avoiding cost increase from the operation of this Order.

12. **Increase in minimum local content**: The Nodal Ministry may annually review the local content requirements with a view to increasing them, subject to availability of sufficient local competition with adequate quality.

13. **Manufacture under license/ technology collaboration agreements with , phased indigenization**: While notifying the minimum local content, Nodal Ministries may make special provisions for exempting suppliers from meeting the stipulated local content if the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for indigenous manufacture of a product developed abroad with clear phasing of increase in local content.

14. **Powers to grant exemption and to reduce minimum local content**: Ministries /Departments of Government of India and the Boards of Directors of Government companies or autonomous bodies may, by written order,

    a. reduce the minimum local content below the prescribed level;

    b. reduce the margin of purchase preference below 20% ;

    c. exempt any particular item or procuring or supplying entities or class or classes of items or procuring or supplying entities from the operation of this Order or any part of the Order.

    A copy of every such order shall be marked to the Member-Convenor of the Standing Committee constituted under this Order.

15. **Directions to Government companies**: In respect of Government companies and other procuring entities not governed by the General Financial Rules, the administrative Ministry or Department shall issue policy directions requiring compliance with this Order.

16. **Standing Committee**: A standing committee is hereby constituted with the following membership:

    Secretary, Department of Industrial Policy and Promotion—Chairman
    Secretary, Commerce—Member
    Secretary, Ministry of Electronics and Information Technology—Member
    Joint Secretary (Public Procurement), Department of Expenditure—Member
    Joint Secretary (DIPP)—Member-Convenor

    The Secretary of the Department concerned with a particular item shall be a member in respect of issues relating to such item. The Chairman of the Committee may co-opt technical experts as relevant to any issue or class of issues under its consideration.

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17. **Functions of the Standing Committee**: The Standing Committee shall meet as often as necessary but not less than once in six months. The Committee

a. shall oversee the implementation of this order and issues arising therefrom, and make recommendations to Nodal Ministries and procuring entities.

b. shall annually assess and periodically monitor compliance with this Order

c. shall identify Nodal Ministries and the allocation of items among them for issue of notifications on minimum local content

d. may require furnishing of details or returns regarding compliance with this Order and related matters

e. may, during the annual review or otherwise, assess issues, if any, where it is felt that the manner of implementation of the order results in any restrictive practices, cartelization or increase in public expenditure and suggest remedial measures

f. may examine cases covered by paragraph 13 above relating to manufacture under license/ technology transfer agreements with a view to satisfying itself that adequate mechanisms exist for enforcement of such agreements and for attaining the underlying objective of progressive indigenization

g. may consider any other issue relating to this Order which may arise.

18. **Removal of difficulties**: Ministries /Departments and the Boards of Directors of Government companies may issue such clarifications and instructions as may be necessary for the removal of any difficulties arising in the implementation of this Order.

19. **Ministries having existing policies**: Where any Ministry or Department has its own policy for preference to local content approved by the Cabinet after 1st January 2015, such policies will prevail over the provisions of this Order. All other existing orders on preference to local content shall be reviewed by the Nodal Ministries and revised as needed to conform to this Order, within two months of the issue of this Order.

20. **Transitional provision**: This Order shall not apply to any tender or procurement for which notice inviting tender or other form of procurement solicitation has been issued before the issue of this Order.

(B. S. Nayak)
Under Secretary to Government of India
Ph. 23061257

SCOPE OF E&M DDC WORK

1 INTRODUCTION

This document describes the General Scope of Services to be provided by the Detailed Design Consultant (DDC). The emphasis is to explain the requirement of work, interfaces with other DDCs/ Contractors for achieving an efficient and safe system to the best International Standards and Practices. DDC shall follow acceptable standards and design procedures akin to best systems wherever not explicitly mentioned.

2. EXTENT OF SERVICES

2.1 Services to be provided

(a) The DDC scope generally includes, but not limited to:

- Proof checking of design and drawings of tender documents for Station, Depot with OCC;
- Perform cost effective detailed design of Electrical, Building Electrical & Mechanical services including illumination, power supply, fire detection and suppression, Air conditioning, BMS and pumps for plumbing systems. This shall be done for complete Station and Depot including OCC. Station air-conditioning is excluded;
- Co-ordinate and integrate design and details with contractors and consultants of other discipline working on the Station and Depot including OCC and contracts works adjacent to the site of work of this contract;
- Manage the design task for cost, schedule and performance compliance;
- Prepare and update during construction Combined Services Drawings (CSD), Structural Opening Drawings (SOD) and Structural-Electrical-Mechanical Drawings (SEM) and identify embedded items/openings indicating system wide information for the purpose of E&M, VAC and BMS coordination;
- Prepare final quantities based on detailed design for Station and Depot including OCC;
- Incorporate and coordinate changes in design due to system-wide interfacing;
- Incorporate changes in design resulting from Engineer/Employer's design review;
- Plan, design, detail, control, coordinate and execute the design phase of the works for production of drawings, documents and reports to meet the key schedule dates included in agreement and as directed by the Engineer/Employer;
- Prepare and submit a Design Quality Control plan to the Engineer/Employer for approval;
- Maintain a Quality Control activity and an effective internal procedure for checking the accuracy of Work and assuring compliance with contract requirements;
- Attend meetings during the design stage connected with the work whenever required;
- Site visits as and when required by Engineer/Employer for design verification;
- Incorporate design submission by other system wide contractors requiring co-ordination with DDC design;
- Interaction for explanation of Design basis, codes followed, reports & calculations performed using presentations, handouts, site visits & hands on experience on software utilization for Engineer/Employer;

- Make available the design support services as and when required during the construction contract to modify existing designs or drawings as necessary to incorporate site conditions and unforeseen conditions; to assist the Engineer/Employer in clarification of queries resulting from the design and to review and confirm Contractor.

(b) In addition to above, for E&M services, the DDC shall also prepare but not limited to:

- Design and Drawings (PD, DD and CRD);
- Layout of the Plant Rooms;
- Ducting & Piping Layout;
- Design of Road Lighting, Depot area lighting using Lighting software AGI-32/ Dialux;
- Designing and Sizing of Earthing and Lightning Protection System (Including preparation of Drawings and Layout);
- Sizing of DG sets, UPS, Cables and selection of Frame Size of Breakers;
- Finalisation of Electrical Load Schedules after interfacing with other Departments of System Group, Other designers /contractors;
- Lighting System Design and drawings for Station and Depot including OCC;
- Small Power Layout (Socket/Lighting DB's),including drawings;
- Layout for cable trenches and Cable/Wire containment system (trays, ladders, conduit, etc),
- Pump sizing for Fire and Plumbing services;
- Fire Detection and Suppression System design and layout;
- General arrangements and layout Drawings for transformers, HT & LT Panels, Switchboards, DG sets, UPS and other necessary equipment etc.
- The DDC shall prepare Testing, Commissioning and acceptance criterion.

(c) In addition to above, for VAC (at Depot including OCC) & BMS services, the DDC shall also prepare but not limited to:

- Design Drawings (PD, DD and CRD);
- Design of BMS system;
- Design & Layout of the ECS for Depot and OCC
- Ducting and Piping Layout
- Design of Electrical System for VAC works including panel, cables etc.;
- Layout for Cable/Wire containment system (Trays, Ladders, Conduit etc.)
- General Arrangement and layout Drawings for Panels, PLCs and other necessary equipment etc.;
- Testing and commissioning and acceptance Criterion.

(d) Prepare Documents – In the form of Data sheet and relevant Calculations.

(e) Determination of final quantity and preparation of BOQ after detailed design,

(f) Co-ordinate and integrate designs and details with other Contractors and Consultants employed by MMRC working on contracts pertaining / relevant to the site of works for this contract including interface.

(g) DDC shall interface with other System Contractors for Preparation of Combined Services Drawings (CSDs), Structural Electrical and Mechanical Drawings (SEMs). DDC shall prepare Construction Reference drawings for complete scope of work and also prepare CSD and SEM Drawings showing and identify embedded items / openings indicating System wide information for the purpose of E&M Co-ordination. Also DDC shall update during construction the CSD and SEM drawings.

(h) Prepare necessary Technical Documentation, Presentation and assist Engineer/Employer to obtain necessary approvals for Electrical, E&M, VAC, DG and BMS System including Fire Detection / Suppression System from the Approving / Statutory Authorities such as Fire Service, Pollution control board (for D.G. sets etc.)

(i) Plan, Design, Detail, Control, Co-Ordinate, and Execute the design phase of the Works for Production of Drawings, Documents and Reports to meet the Key Schedule Dates included in the Agreement and as directed by the Engineer/Employer. Provide design support and be available for any clarification and to review the executed work for compliance with the design and to carry out design changes required during construction and witnessing (as required) during testing and commissioning of installations.

2.2 Duties and Responsibilities of the DDC

The DDC shall initiate in consultation with Engineer/ Employer and actively pursue and involve itself in all investigations and enquiries, consultations, studies, collection and compliance with pertinent information and data, convening of and attendance at meetings, and in any other activities as are or may be necessary for producing the detailed design, drawings and documents to the specified requirements.

The DDC shall carry out the Services in accordance with its own methods, in compliance with the provisions of the Agreement. Any and all changes necessary to ensure that the DDC's design, drawings and documents conform to the intent and purpose set out in the Agreement, shall be made at the DDC's own expense.

The DDC represents that it is a professional and experienced consultant providing full consultancy services, and hereby agrees to bear full responsibility for the correctness and technical merit of the services performed.

2.3 Basis of Detailed Design

The detailed design, drawings and documents shall be developed by the DDC based on BOQ and technical specifications and reference drawings, interface requirements and other information to be issued to or gathered by the DDC before the start of design work.

The DDC shall comply in producing its detailed design and drawings in accordance with the checking requirements specified below in this document.

The detailed design of the specified works and the incorporation of all system-wide requirements are the responsibility of the DDC. The DDC shall remain totally committed to the overall integrity of the design, if necessary actively seeking advice, information and clarification so as to avoid abortive work.

The DDC's design shall take into account the installation requirements of the system-wide information, which will include the provision of openings, conduits, fixings, bases, plinths and loadings etc. The DDC shall incorporate the requirements of the system-wide contractors into its design as appropriate and as they become available.

2.4 Requirements for Earthing, Bonding and Corrosion Protection

The DDC shall incorporate the relevant requirements of earthing and bonding during detail design.

2.5 System-wide Information / Requirements

The DDC shall incorporate all the relevant information made available at Appendix 19, regarding the system-wide works in its design and other documents including, but not limited to:

- Depot Civil;
- Depot Equipment;
- Rolling stock;
- Track work;
- Overhead line electrification;
- Signalling;
- Communications including Closed Circuit Television (CCTV), Public Address (PA),
- SCADA systems;
- Traction power;
- Automatic fare collection system;
- Lifts and Escalators;
- Station VAC.

2.5 Electrical- HT works

Scope of design of Electrical HT services shall include the followings but not limited to:

- GIS
- Transformers
- 33kV Cabling
- Power supply arrangement

2.6 Electrical and Mechanical Services for Station and Depot including OCC

The Electrical and Mechanical services shall include the review of design of all E&M services in the stations, depot including OCC and property development area. The scope of DDC shall cover the provision of cable duct/ trenches routing & support for the 33 kV cable looped in and out at the ASS and in depot area. The route includes the trench/ pipes planned to carry 33KV cable. The scope shall include the preparation of drawings, layouts, erection/ mounting details, interface with the system-wide contractor or arising out of concurrent works as required. The DG room or pump rooms shall have provision for a beam & chain pulley block for lifting of equipment for maintenance/ installation handling. Provision shall normally include unloading/ loading of material on to or from the maintenance vehicle. This shall include the incorporation of architectural co-ordination requirements with the requirements of other disciplines and the detailed design of the following services:

- Power requirement of lifts & escalators;

- E&M support provisions;
- Low voltage distribution;
- Emergency lighting connected to UPS backed by DG set and normal supply;
- Essential lighting backed by DG set supply;
- General purpose power;
- Exit Signage;
- Uninterruptible power supply system (UPS) for lighting loads;
- Lightning protection;
- Power factor correction;
- Power supplies for other contracts;
- Air conditioning (except Station)
- Ventilation
- Water pumps and automatic control;
- Drainage, plumbing and sewerage pumps;
- Lighting power distribution for parking areas, circulation area, station face lighting, Depot Buildings, OCC and associated areas;
- Provision of cable ducts, cable ways or trenches for all the cables including in coming 33 kV supply cable or cables supplied by all contractors.
- Smoke management system
- Design of Power and Control cables from LV Main Switchboard in the ASS to the Sub main and other Distribution/ Sub Distribution Boards etc. This will include provision of Bus Trunking / Feeder Cables as required.
- Design of UPS for Essential loads.
- Design of DG sets for feeding all Emergency, Essential and Semi Essential loads.
- Design of Interlocks and Protection Schemes for Power distribution, suiting to the desired operation, duly co-operated with high voltage side protections and protection of the individual equipment. DDC shall also provide the relay settings including the relay coordination between HT and LT power supplies.
- Design of normal and emergency lighting arrangement & automatic operation in Station areas, Depot buildings, OCC, cable galleries, parking areas, entry/exit and other room. This includes external cabling and provision of lighting fixtures with lamps, ballast, control gear, etc.
- Design of Earthing and bonding System comprising of earth mats, earth electrodes and Main earth terminals, Clean Earth System, Design of Control and small power supplies to various station equipment/panel.
- Design of Lightning Protection System
- Design of complete Fire Detection & Alarm system including monitoring and control through a Fire Alarm Panel at Station Control Room and
- Design of Fire suppression system including Hydrants, Hose Reels, Sprinklers System, Fire Hose Cabinets, Portable Extinguishers, Gas Based Flooding System, pipe line network with control valves for sprinklers and hydrants.
- Cable routing for HT and LT cables in such a way that no cable pass through underground trenches inside the shed area. They should be taken along the wall or along the roof. Design of cable trays etc. should be done keeping in view aesthetics and to ensure that cables are not visible.
- Compressed Air System, Compressor Piping
- EOT Crane
- Suitable timers to automatically switch off the fans installed on pillars in inspection bays and workshop areas shall be designed to ensure that the power supply to the fans are switched off after a pre-determined time to ensure energy conservation.

2.7 Presentation Material, Mock-up, Working Models and Samples

The DDC shall provide the Engineer/Employer with information covered by this Design or such purposes of presentation or display as required. Information shall consist of material in the form of descriptions of the works executed and the resources and manpower employed and shall include graphs, sketches and photographs for inclusion in publications or for making into displays and exhibits.

2.8 As-Built Drawings of the Works

The DDC shall review the contract record drawings and as-built information submitted by the contractors to the Engineer/Employer on a continuous basis prior to the issuance of the Certificate of Completion for the construction contract. The DDC shall prepare relevant calculations reconciled with as-built conditions and information necessary for the maintenance of works.

2.9 Performance

The progress or performance of the DDC's work is seen to be at any time inadequate to meet the requirements, the DDC shall take the necessary steps to improve them on being so notified. If within a reasonable period the DDC has not improved its progress or performance, the Engineer/Employer may by written notice require it to take additional measures, including changes in its organisation, at no additional cost. Such notice shall be in no way deemed to constitute a waiver of Employer's rights to terminate Agreements by reason of the DDC's breach of contract. Failure by the Engineer/Employer's to issue such a notice shall not relieve the DDC of its obligation to achieve the required rate of progress and quality of work.

3 STANDARD OF SERVICES

3.1 General

The DDC shall be responsible for the correctness and technical merit of its designs, calculations, drawings and all other documentation prepared by it in carrying out the services.

The DDC shall ensure that qualified and experienced staffs are employed in sufficient number and that accurate, consistent, clear and easily read drawing and documents are produced in time.

The DDC shall comply with the provisions and procedures covering standards and codes, drawings and calculations as per tender documents. The DDC shall also comply with the checking procedures as specified below.

3.2 Calculations

Calculations shall be prepared according to the best professional standards and compiled into sets that relate to particular aspects of design.

Each set of calculations for systems shall include:

- Design summary
- Load calculations, equipment rating and cable sizing (after optimization) including connected load, maximum demand and short circuit level at each panel and distribution board

- Rating of protection devices; and
- Lighting levels and calculation for luminaries.
- Equipment and component sizing for Batteries, Diesel fuel tank, MCC's, Panel boards, Switchboards including calculation of connected load, maximum demand and short circuit level at each panel & Distribution Board.
- Load Flow Analysis including Load Study Calculation, Power Factor Correction, Protection co-ordination, Selection of Switchgear and Short circuit calculations.
- Calculation for Earthing and Lightning Protection System including Earthing current / Resistance, lightning protection and Step / touch voltages
- Cable sizing including voltage drops
- Calculation for Cable Duct / Cable Trunking System including Cable pulling tension calculation, Cable tray sizing, Provision of Conduits, Conduit / tray fill calculation, Manholes / draw box sizes
- Lighting System Calculations including Indoor lighting calculation, Outdoor lighting calculation.
- Heat Load Calculation and equipment sizing of HVAC system for Depot and OCC
- Pumps for Water supply, water treatment system
- Fire detection, fire suppression scheme
- Pumps for Seepage and Sewage scheme
- Pressure drop calculation for fans
- Compressed air system and piping design and its layout for workshop and as required area
- Ventilation system for Depot and OCC, basement of station

Engineer/Employer's may require the submission of applicable software including in house software programme / worksheets developed by the contractor, computer input and programme logic for its review prior to the acceptance of the computer output.

Original calculations shall be submitted to the Employer's Representative for proof checking. Each sheet shall be signed in accordance with the requirements of checking procedures. Original calculations shall be returned by Engineer/Employer and retained by the DDC and shall be produced at such times as may be required by the Employer's Representative. Should the calculations of the permanent works be revised thereafter and such revision renders the calculations as submitted obsolete or inaccurate, the DDC shall prepare and submit the revised calculations. The original calculations shall be handed to the Engineer/Employer on completion of the services.

3.3 Drawings Prepared by DDC

All drawings shall be prepared in A-1 size and shall be produced by CADD/BIM graphic system compatible with the Engineer/Employer system and as approved by the Engineer/Employer's Representative. Drawings are defined as:

- **Preliminary Design Drawings** are drawings that have been prepared by the DDC after award of contract and have been approved by Engineer/Employer.

- **Detailed Design Drawings** are drawings that have been prepared by the DDC after award of contract and have been approved by Engineer/Employer.

- **Combined Services Drawings (CSD)** are drawings prepared by the DDC and approved by Engineer/Employer, showing locations, layouts and sizes of al

services including those of other contractors, co-ordinated, so as to eliminate all clashes.

- **Structural, Electrical, Mechanical drawings (SEM)** are drawings prepared by the DDC and approved by the Engineer/Employer, showing the location, sizes and details of opening in structural elements for Mechanical and Electrical facilities and other related contracts.

- **Construction Reference Drawings** are the drawings that have been prepared by the DDC after incorporation of all the requirement complete with fixing and mounting detail required for execution and approved by Engineer/Employer together with other relevant documentation. The CRD Drawings shall be stamped "Issued for Construction".

DDC shall submit to the Engineer/ Employer as part of a progress register, a list, showing drawing numbers, titles, scales and the progress status of all drawings planned. The DDC shall update the register as required. All drawings shall be checked for compliance with design specifications and for accuracy by the DDC's design staff and shall also be subjected to the checking procedures as specified.

3.4 Drawings Prepared by Construction Contractor

- **Shop Drawing** contain information related to the permanent works. The DDC engineering staff shall check these drawings and a report shall be furnished to the Engineer/Employer.

- **Working Drawings** Comprise the Good for Construction drawings or documents, as are necessary to amplify the Construction Reference Drawings for construction purposes and endorsed, as required by the Engineer/Employer. It contains information related to temporary work details for the construction of the permanent works. The DDC engineering staff shall check these drawings and a report furnished to the Employer Representatives.

- **As Built Drawings** depict the completed works that have been certified complete. These drawings shall have been reviewed by the DDC and a report furnished to the Engineer/ Employer.

3.5 Computer Programs

The DDC shall submit details and verification of all computer programs it intends to use to the Engineer/Employer's for acceptance prior to use in making calculations. These shall include the computer program manuals, input and output printout of a typical example and previous records of its use by the DDC. The DDC may also be required to perform test calculations using the program so that the results may be compared with those obtained by other means.

4 CHECKING PROCEDURES

4.1 General

The DDC shall establish a Quality Assurance Plan (QAP) and a system of internal checking and approval of all designs, including calculations, drawings and other documents prepared and issued by it, to the Employer's Representative for acceptance.

The purpose of the checking shall be to ensure accuracy and consistency, as well as compliance with current requirements, standards, codes and the requirements of this document. Certification of such a check has been carried out shall be issued to the

Employer's Representative with each batch of documentation for acceptance at the final submission and subsequent submissions.
Internal checks shall be carried out by personnel who have experience and competence equal or superior to the originator, but who have not been involved in producing the original design.

4.2 Design Calculations

Each page of design calculations, including any amendments thereto, shall be endorsed as checked and approved prior to issuing to the Employer's Representative by being initialled and dated by both the originator and the checker. The checker shall append a statement explaining the method of checking used.

4.3 Drawings and Documents

Each document and drawing, including any revisions thereto, shall be endorsed as checked and approved prior to issue to the Employer's Representative by being initialled and dated by both originator and checker. In addition to compliance with the requirements of the documentation, each drawing, where appropriate, shall be checked to ensure compliance with the DDC's certified design calculations.

4.4 Responsibility

Notwithstanding acceptance by the Employer's Representative, the DDC shall remain responsible for the quality of the documents.

4 DESIGN SUBMISSION & REVIEW

4.1 Progress Meetings

DDC will attend progress meetings. The DDC will be required to produce:

- An updated copy of the computerised project schedule and a design chart showing scheduled and actual start and finish dates and estimated percentage completion for each major design activity;

- An updated copy of the Progress Register showing the titles and status of all drawings and documents;

4.2 Review Submission

The Review submission shall include, but not be limited to:

- Design calculations which are indexed and checked;
- Drawings sufficiently detailed to define the Scope of Works, complete and checked;
- Combined Service Drawings; (CSDs);
- Structural-Electrical-Mechanical Drawings (SEMs);
- System Erection Drawings;
- Design Basis Report including specific actions which are necessary to complete the design;

❖ Fire drawings comprising as a minimum of the following:

- Fire detection single line diagram

- Fire detection system layouts
- Fire suppression single line diagram
- Fire suppression layout floor wise and external layout.
- Details of various sub-systems, sprinkler layout, automatic gas flooding

❖ Electrical drawing comprising as a minimum of the following:

(i) Single line diagram of electrical system including Panels and DB's, Cable sizing etc.

(ii) Wiring layout floor wise and external. This shall include location of DB's, Lighting fixtures, sockets, fans etc and wiring details.

(iii) Cable tray layouts showing section of cable tray at different places, number of cable, spacing, spare capacity etc.

(iv) Equipment layout of Generator room, UPS room, ASS, Pump Room, Tanks and Water Treatment Room and other such equipment room showing layout of equipment's, cable tray / trenches / ladders / raceways, clearances and spacing.

(v) Earthing single line diagrams. The location of earth mats / pits may be shown on electrical layout.

(vi) Lightning protection layout.

❖ VAC drawing (except Station) comprising as a minimum of the following:

(i) Single line diagram of air-conditioning system

(ii) Equipment layout

(iii) Air Conditioning Layout

(iv) Ventilation layout

(v) Ducting and piping Layout and other details as may be necessary for proper execution of requisite VAC works.

❖ BMS drawings comprising as a minimum of the following :

(i) System Architecture & equipment layout

(ii) PLC configuration diagram

(iii) List of I/Os.

4.3 Final Review Procedure

The Employer's Representative will complete the Final Review of all details submitted within approximately 3Weeks, and furnish the DDC with his review comments either in writing or on marked up drawings. Within 3 weeks from the last day of review, the DDC shall deliver to the Employer's Representative 6 copies of the updated document with its responses to all comments.

4.5 Submission of Originals

When all the comments of the Final Review submission are incorporated, the submission of originals shall be made to the Engineer/Employer.

4.6 Delivery of Documents

After the acceptance of the submission of the Originals, the DDC shall deliver in electronic format of all Documents, Calculations, various Drawings and input files of all the analysis prepared by it to the Engineer/Employer.

4.7 Final Design Summary Report

The purpose of this report is to provide a convenient reference to the design and operation of the system. The report shall cover the service stage scenario. The Final Design Summary Report shall include, but not be limited to:

- Work Description;
- Drawing Index;
- Key Design Drawings from all disciplines;
- Site Plan;
- System Operation;
- Design Criteria; and
- Technical Descriptions

5 SUBMISSION OF DOCUMENTS

The DDC shall deliver the drawings and documents as listed to the Engineer/ Employer's Representative and packaged as directed by the Engineer/Employer.

5.1 Quality Assurance Plan

4 copies of the Quality Assurance Plan

5.2 Review Submission

6 set full size (A-1) sets of drawings with soft copies.

5.3 Submission of Construction Drawings

6 sets of all conformed drawings marked "for Construction" with soft copies.

5.5 Submission of "As-Built" Drawings

3 sets of "As-Built" drawings endorsed by the DDC, and
3 sets of Final Design Summary Report with soft copies.

5.6 Submission of Combined Services Drawings (CSD's)

3 sets of drawings with Soft Copies

5.7 Submission of Services Electrical & Mechanical Drawings (SEM's)

3 sets of drawings with Soft Copies

5.8 Design Certificate

All document submissions shall be accompanied by two original copies of a Design Certificate signed by the Contractor and the Designer.

APPENDIX M – UNDERTAKING FOR LOCAL CONTENT

(As per clause 1.1.14 of NIT)

(Ref: Government of India's Order issued by Ministry of Commerce and Industry, Department of Industrial Policy and Promotion vide letter no.P-45021/2/2017-BE-II Dated 15th June, 2017)

We, the Local Supplier, do hereby undertake that the items offered shall meet the minimum local content of 50 % in terms of Government of India's above referred order while complying all the conditions/drawings/specifications etc. given in the Tender Documents, to get the purchase preference as mentioned in the above referred order of Government of India

We, further undertake that while executing the contract, a certificate from the statutory or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content shall be submitted to the Engineer/Employer in confirmation of minimum 50 % of local content in the items/services provided. We shall also submit to the Employer/Engineer, the details of the location(s) at which the local value addition is made for verification of the content.

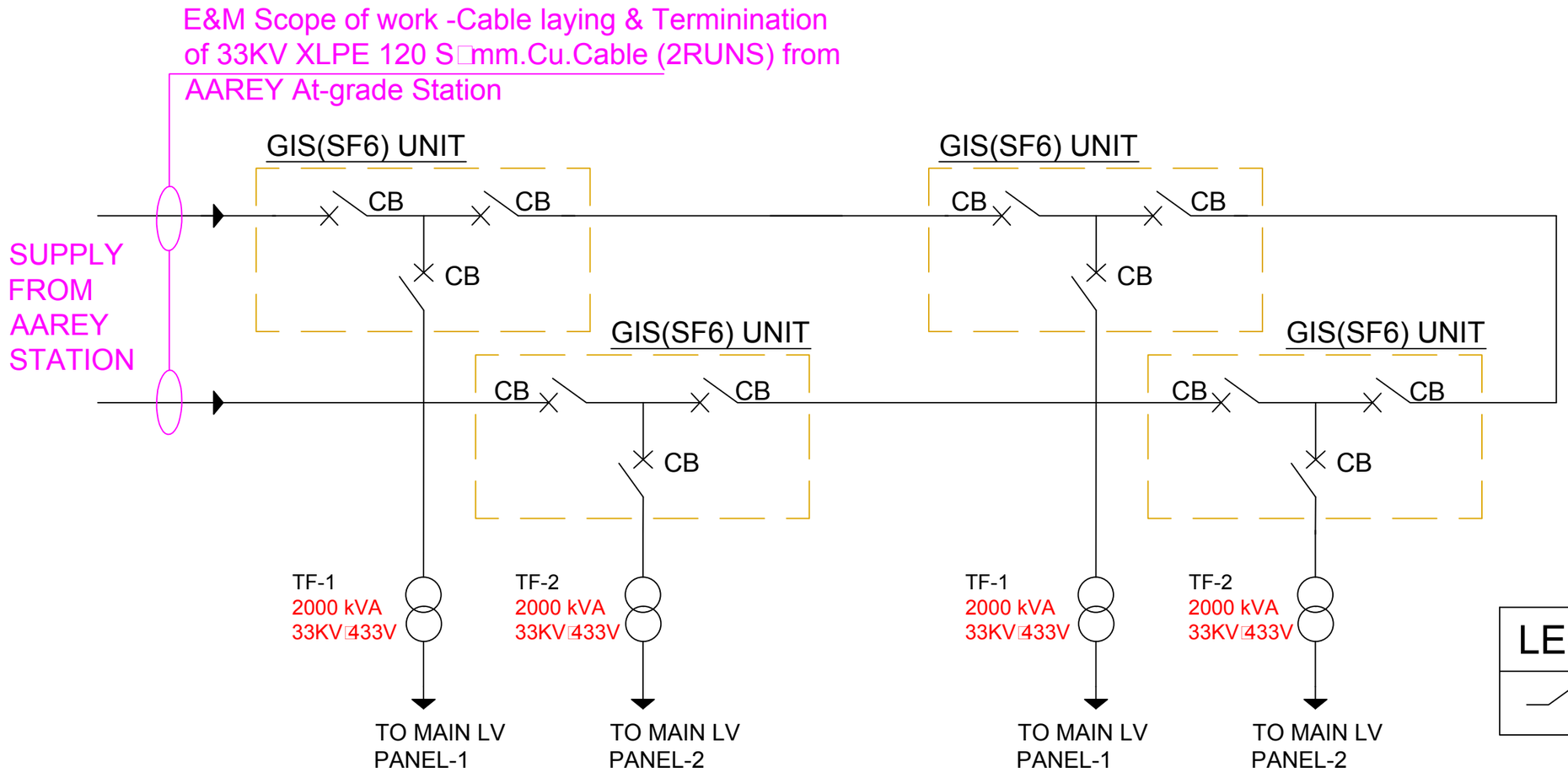
Stamp & Signature of Authorized Signatory

NOTE:

The undertaking shall be signed by authorized signatory of the tenderer. In case of JV / Consortium by the authorized signatory of the constituent members counter signed by the authorized signatory of tenderer.

Attachment No.4 to Addendum No. 1

TYPICAL 33KV RING MAIN SYSTEM & 33KV □433V SUBSTATION AT AAREY DEPOT



LEGENDS:-	
	Circuit Breaker

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R1	24-08-17			Technical Detail Updated

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

KEY PLAN

E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

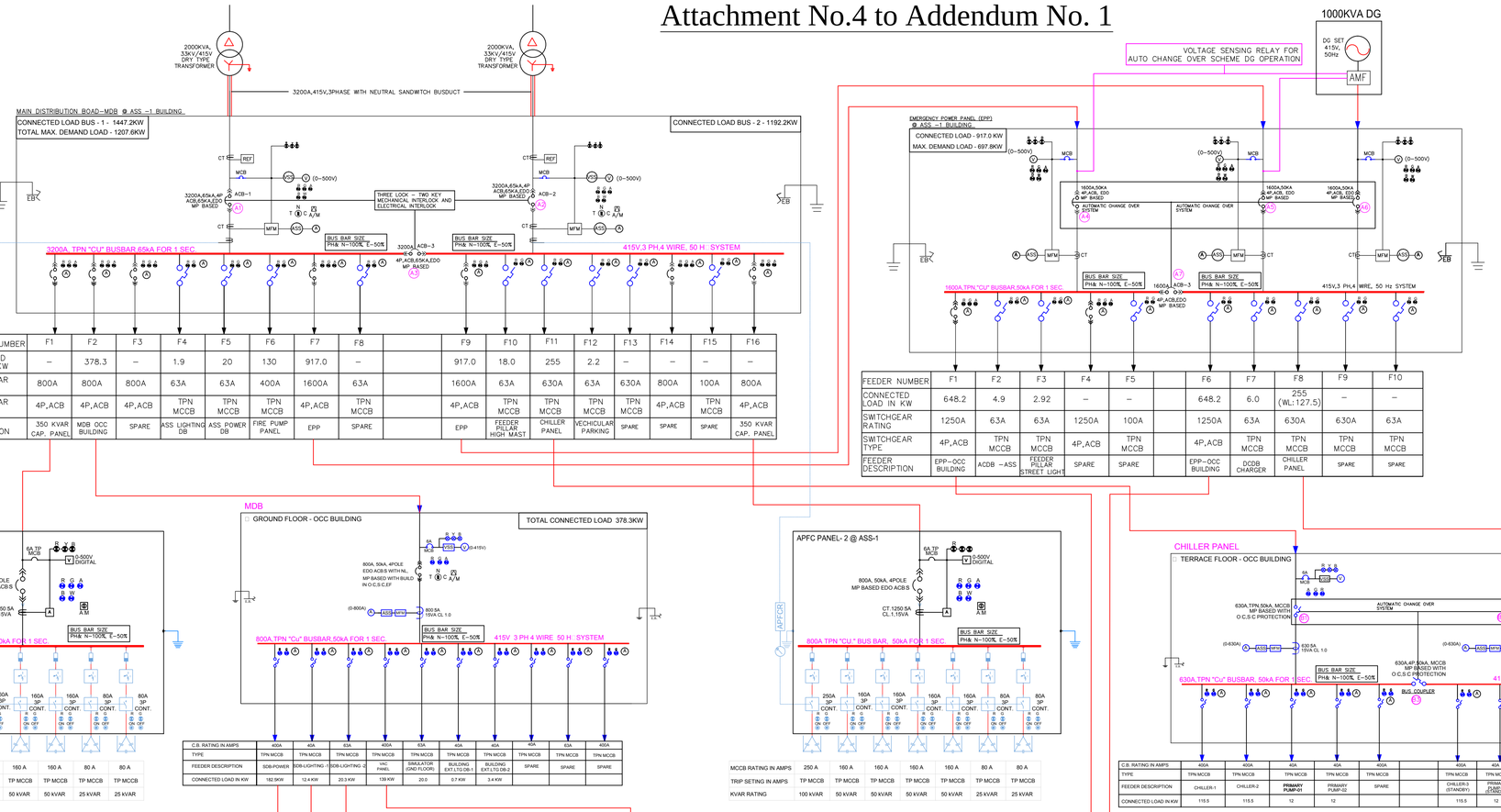
22-Aug-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: AUG-2017
TITLE: GENERAL ARRANGEMENT DRAWING
DRAWING TITLE: TYPICAL 33KV DISTRIBUTION SCHEME
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1002

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

Attachment No.4 to Addendum No. 1



FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8		F9	F10	F11	F12	F13	F14	F15	F16
CONNECTED LOAD IN KW	–	378.3	–	1.9	20	130	917.0	–	63A	917.0	18.0	255	2.2	–	–	–	–
SWITCHGEAR RATING	800A	800A	800A	63A	63A	400A	1600A	4P,ACB	TPN MCCB	1600A	63A	630A	63A	630A	800A	100A	800A
SWITCHGEAR TYPE	4P,ACB	4P,ACB	4P,ACB	TPN MCCB	TPN MCCB	TPN MCCB	4P,ACB	TPN MCCB		4P,ACB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	4P,ACB	TPN MCCB	4P,ACB
FEEDER DESCRIPTION	350 KVAR CAP. PANEL	MDB OCC BUILDING	SPARE	ASS LIGHTING DB	ASS POWER DB	FIRE PUMP PANEL	EPP	SPARE		EPP	FEEDER PILLAR HIGH MAST	CHILLER PANEL	VECHICULAR PARKING	SPARE	SPARE	SPARE	350 KVAR CAP. PANEL

FEEDER NUMBER	F1	F2	F3	F4	F5		F6	F7	F8	F9	F10
CONNECTED LOAD IN KW	648.2	4.9	2.92	–	–		648.2	6.0	255 (WL:127.5)	–	–
SWITCHGEAR RATING	1250A	63A	63A	1250A	100A		1250A	63A	630A	630A	63A
SWITCHGEAR TYPE	4P,ACB	TPN MCCB	TPN MCCB	4P,ACB	TPN MCCB		4P,ACB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	EPP–OCC BUILDING	ACDB –ASS	FEEDER PILLAR STREET LIGHT	SPARE	SPARE		EPP–OCC BUILDING	DCDB CHARGER	CHILLER PANEL	SPARE	SPARE

ELECTRICAL & MECHANICAL INTERLOCK AT MAIN LT PANEL (2/3 INTERLOCK)

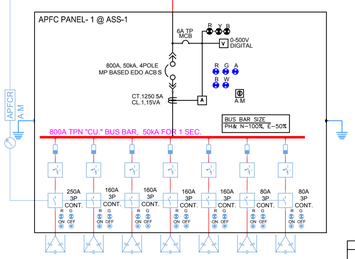
SL.NO	FROM TRANSFORMER–1 INCOMER ACB–1(A1)	FROM TRANSFORMER–2 INCOMER ACB–2(A2)	BUS–COUPLER ACB–3(A3)
1	ON	ON	OFF
2	ON	OFF	ON
3	OFF	ON	ON

ELECTRICAL & MECHANICAL INTERLOCK AT EMERGENCY PANEL

SL.NO	NORMAL INCOMER ACB–4(A4)	NORMAL INCOMER ACB–5(A5)	DG INCOMER ACB–6(A6)	BUS COUPLER ACB–7(A7)
1	ON	ON	OFF	OFF
2	ON	OFF	OFF	ON
3	OFF	ON	OFF	ON
4	OFF	OFF	ON	ON

ELECTRICAL & MECHANICAL INTERLOCK AT CHILLER PANEL (2/3 INTERLOCK)

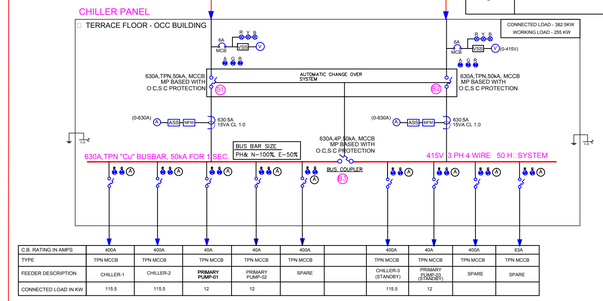
SL.NO	CHILLER INCOMER–1 MCCB–1(B1)	CHILLER INCOMER–2 MCCB–2 (B2)	BUS–COUPLER MCCB–3(B3)
1	ON	ON	OFF
2	ON	OFF	ON
3	OFF	ON	ON



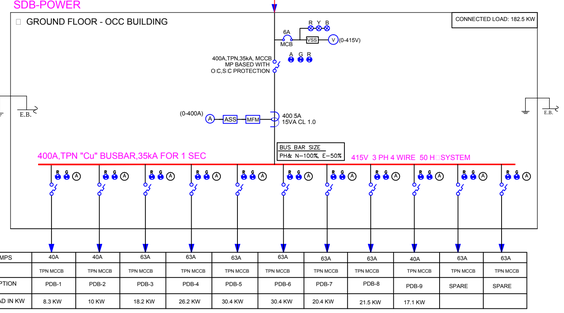
MCCB RATING IN AMPS	250 A	160 A	160 A	160 A	160 A	80 A	80 A
TRIP SETING IN AMPS	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
KVAR RATING	100 KVAR	50 KVAR	50 KVAR	50 KVAR	50 KVAR	25 KVAR	25 KVAR

C.B. RATING IN AMPS	400A	40A	63A	400A	63A	40A	40A	40A	63A	63A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	SDB-POWER	SDB-LIGHTING -1	SDB-LIGHTING -2	VAC PANEL	SIMULATOR (GND FLOOR)	BUILDING EXT.LTG DB-1	BUILDING EXT.LTG DB-2	SPARE	SPARE	SPARE
CONNECTED LOAD IN KW	182.5KW	12.4 KW	20.3 KW	139 KW	20.0	0.7 KW	3.4 KW			

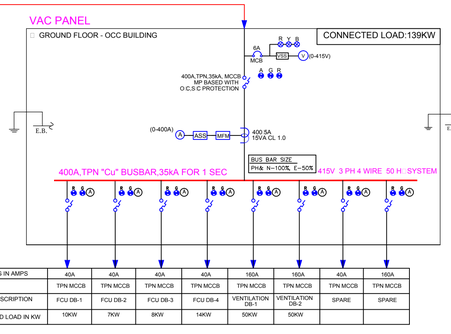
MCCB RATING IN AMPS	250 A	160 A	160 A	160 A	160 A	80 A	80 A
TRIP SETING IN AMPS	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
KVAR RATING	100 KVAR	50 KVAR	50 KVAR	50 KVAR	50 KVAR	25 KVAR	25 KVAR



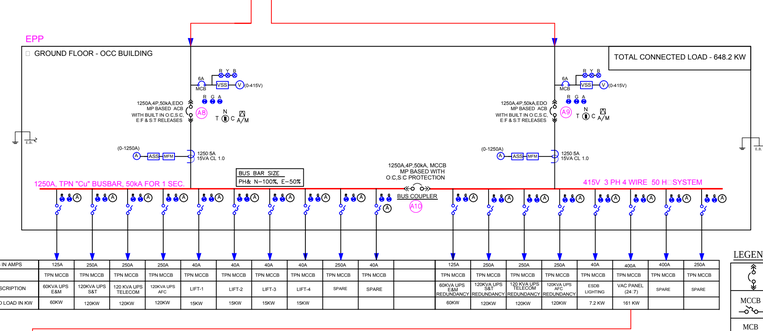
C.B. RATING IN AMPS	400A	400A	40A	40A	400A		400A	40A	40A	63A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB		TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	CHILLER-1	CHILLER-2	PRIMARY PUMP-01	PRIMARY PUMP-02	SPARE		CHILLER-3 (STANDBY)	PRIMARY PUMP-03 (STANDBY)	SPARE	SPARE
CONNECTED LOAD IN KW	115.5	115.5	12	12			115.5	12		



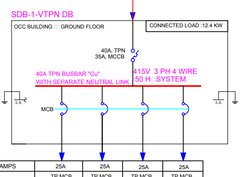
C.B. RATING IN AMPS	40A	40A	63A	63A	63A	63A	63A	63A	40A	63A	63A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	PDB-1	PDB-2	PDB-3	PDB-4	PDB-5	PDB-6	PDB-7	PDB-8	PDB-9	SPARE	SPARE
CONNECTED LOAD IN KW	8.3 KW	10 KW	18.2 KW	26.2 KW	30.4 KW	30.4 KW	20.4 KW	21.5 KW	17.1 KW		



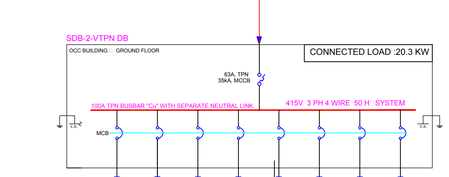
C.B. RATING IN AMPS	40A	40A	40A	40A	160A	160A	40A	160A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	FCU DB-1	FCU DB-2	FCU DB-3	FCU DB-4	VENTILATION DB-1	VENTILATION DB-2	SPARE	SPARE
CONNECTED LOAD IN KW	10KW	7KW	8KW	14KW	50KW	50KW		



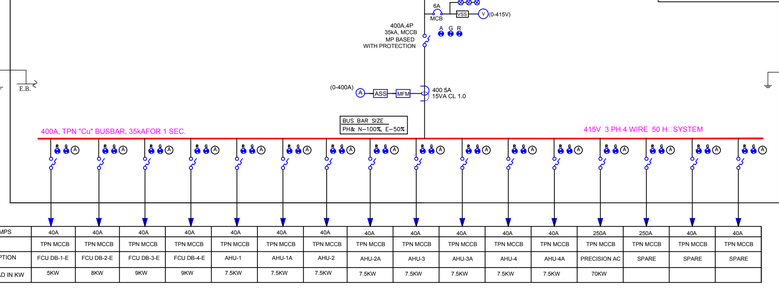
C.B. RATING IN AMPS	125A	250A	250A	250A	40A	40A	40A	40A	250A	40A		125A	250A	250A	250A	40A	400A	400A	250A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB		TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	60KVA UPS E&M	120KVA UPS S&T	120 KVA UPS TELECOM	120KVA UPS AFC	LIFT-1	LIFT-2	LIFT-3	LIFT-4	SPARE	SPARE		60KVA UPS E&M REDUNDANCY	120KVA UPS S&T REDUNDANCY	120 KVA UPS TELECOM REDUNDANCY	120KVA UPS AFC REDUNDANCY	ESCB LIGHTING	VAC PANEL (24:7)	SPARE	SPARE
CONNECTED LOAD IN KW	60KW	120KW	120KW	120KW	15KW	15KW	15KW	15KW				60KW	120KW	120KW	120KW	7.2 KW	181 KW		



C.B. RATING IN AMPS	25A	25A	25A	25A
TYPE	TP MCB	TP MCB	TP MCB	TP MCB
FEEDER DESCRIPTION	LDB -01	LDB -02	LDB -03	SPARE
CONNECTED LOAD IN KW	2.4	5.0	5.0	



C.B. RATING IN AMPS	25A	25A	25A	25A	25A	25A	25A	25A
TYPE	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB
FEEDER DESCRIPTION	LDB -04	LDB -05	LDB-06	LDB-07	LDB-08	SPARE	SPARE	SPARE
CONNECTED LOAD IN KW	4.0	4.6	3.9	4.5	3.4			



C.B. RATING IN AMPS	40A	40A	40A	40A	40A	40A	40A	40A	40A	40A	40A	40A	40A	250A	250A	40A	40A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	FCU DB-1-E	FCU DB-2-E	FCU DB-3-E	FCU DB-4-E	AHU-1	AHU-1A	AHU-2	AHU-2A	AHU-3	AHU-3A	AHU-4	AHU-4A	PRECISION AC	SPARE	SPARE	SPARE	
CONNECTED LOAD IN KW	5KW	8KW	9KW	9KW	7.5KW	7.5KW	7.5KW	7.5KW	7.5KW	7.5KW	7.5KW	7.5KW	70KW				

ELECTRICAL & MECHANICAL INTERLOCK AT EMPDB–OCC BUILDING (2/3 INTERLOCK)

SL.NO	FROM EPP BUS–1 INCOMER ACB–1(A8)	FROM EPP BUS–2 INCOMER ACB–2(A9)	BUS–COUPLER ACB–3(A10)
1	ON	ON	OFF
2	ON	OFF	ON
3	OFF	ON	ON

LEGEND:-

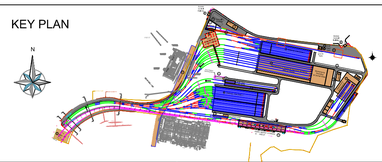
ACB	AIR CIRCUIT BREAKER	R G A	ON,OFF,TRIP
MCCB	MOULDED CASE CIRCUIT BREAKER	Cu	COPPER
MCB	MINIATURE CIRCUIT BREAKER	kA	KILO AMPERES
A	AMMETER DIGITAL	TP	TRIPLE POLE
V	VOLTMETER DIGITAL	TPN	TRIPLE POLE & NEUTRAL
CT	CURRENT TRANSFORMER	4P	FOUR POLE
VTPN	VERTICAL TRIPLE POLE & NEUTRAL	kVA	KILO VOLT AMPERE
	EARTH CONNECTION	E.B.	EARTH BUS
R Y B	PHASE INDICATION LAMP	MDO	MANUAL DRAWOUT
TM	THERMAL MAGNETIC RELEASE	MP	MICROPROCESSOR RELEASE

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R1	24-08-17			Technical detail updated

MMRC

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

KEY PLAN



E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		
24-08-2017		

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: AUG-2017

TITLE: GENERAL PANEL DRAWING

DRAWING TITLE: ASS -1 MAIN SCHEMATIC DIAGRAM AARREY DEPOT

SCALE: NTS

DRAWING NO: MM3-GC-DEL-GD-8-D09-1004

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

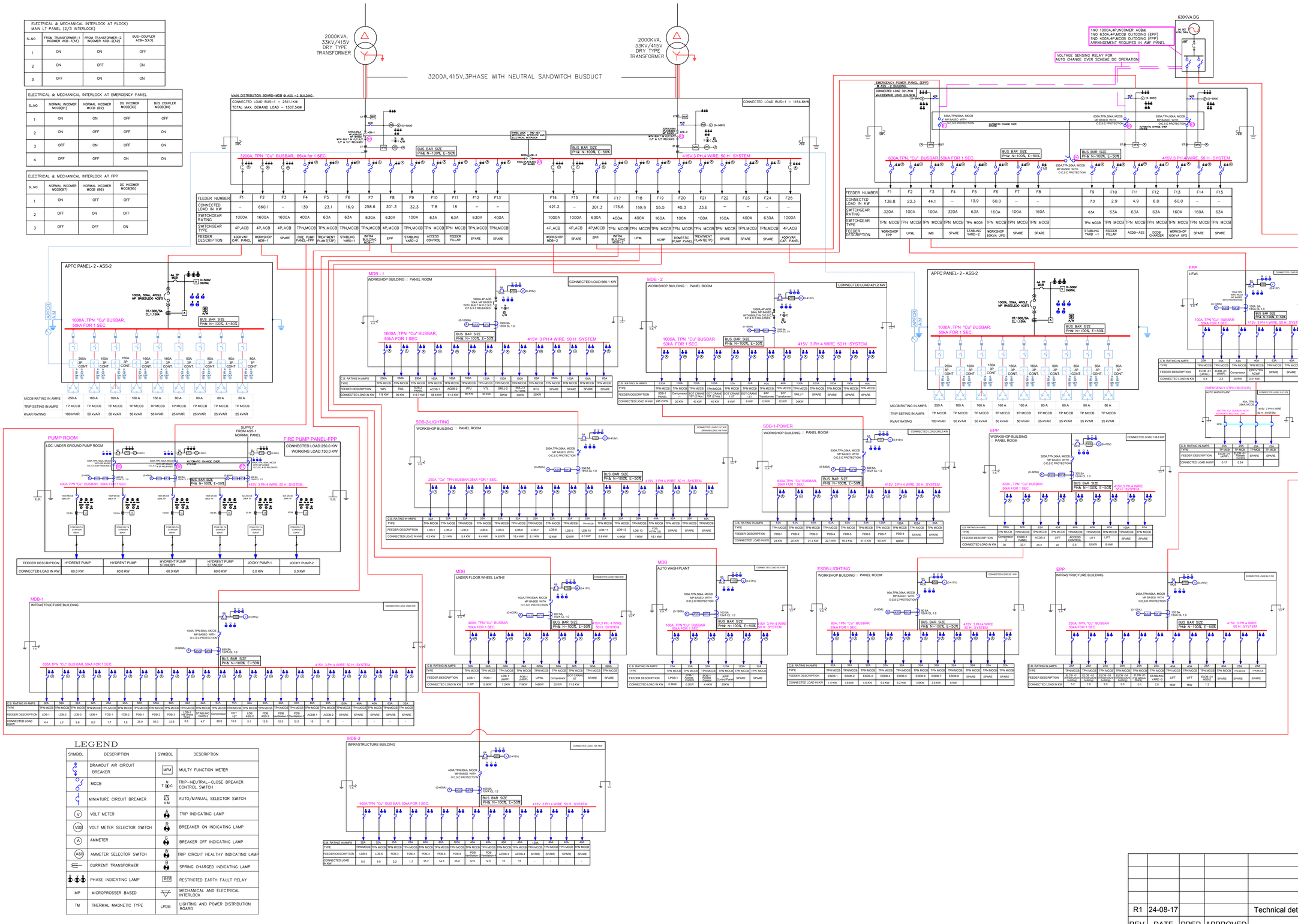
F E D C B A

Attachment No.4 to Addendum No. 1

ELECTRICAL & MECHANICAL INTERLOCK AT RLOCK) MAIN LT PANEL (2/3 INTERLOCK)			
SL.NO	FROM TRANSFORMER-1 INCOMER ACB-1(A1)	FROM TRANSFORMER-2 INCOMER ACB-2(A2)	BUS-COUPLER ACB-3(A3)
1	ON	ON	OFF
2	ON	OFF	ON
3	OFF	ON	ON

ELECTRICAL & MECHANICAL INTERLOCK AT EMERGENCY PANEL				
SL.NO	NORMAL INCOMER MCCB(81)	NORMAL INCOMER MCCB (82)	DG INCOMER MCCB(83)	BUS COUPLER MCCB(84)
1	ON	ON	OFF	OFF
2	ON	OFF	OFF	ON
3	OFF	ON	OFF	ON
4	OFF	OFF	ON	ON

ELECTRICAL & MECHANICAL INTERLOCK AT FPP			
SL.NO	NORMAL INCOMER MCCB(87)	NORMAL INCOMER MCCB (86)	DG INCOMER MCCB(85)
1	ON	OFF	OFF
2	OFF	ON	OFF
3	OFF	OFF	ON



FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	F25
CONNECTED LOAD IN KW	–	660.1	–	130	23.1	16.9	258.6	301.3	32.3	7.8	18	–	–	421.2	–	301.3	176.6	198.9	55.5	40.3	33.6	–	–	–	–
SWITCHGEAR RATING	1000A	1600A	1600A	400A	63A	63A	630A	630A	100A	63A	63A	630A	400A	1000A	1000A	630A	400A	400A	160A	100A	100A	160A	400A	630A	1000A
SWITCHGEAR TYPE	4P,ACB	4P,ACB	4P,ACB	TPN,MCCB	TPN,MCCB	TPN,MCCB	TPN,MCCB	4P,MCCB	TPN,MCCB	TPN MCCB	TPN MCCB	TPN,MCCB	TPN,MCCB	4P,ACB	4P,ACB	4P,MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN,MCCB	TPN,MCCB	4P,ACB
FEEDER DESCRIPTION	400KVAR CAP. PANEL	WORKSHOP MDB-1	SPARE	FIRE PUMP PANEL-FPP	TREATMENT PLANT(STP)	STABLING YARD-1	INFRA BUILDING MDB-1	EPP	STABLING YARD-2	ACCESS CONTROL	FEEDER PILLAR	SPARE	SPARE	WORKSHOP MDB-2	SPARE	EPP	INFRA BUILDING MDB-2	UFWL	ACWP	DOMESTIC PUMP PANEL	TREATMENT PLANT(ETP)	SPARE	SPARE	SPARE	400KVAR CAP. PANEL

FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8		F9	F10	F11	F12	F13	F14	F15
CONNECTED LOAD IN KW	138.8	23.3	44.1	–	13.9	60.0	–	–		7.3	2.9	4.9	6.0	60.0	–	–
SWITCHGEAR RATING	320A	100A	100A	320A	63A	160A	100A	160A		63A	63A	63A	63A	160A	160A	63A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB		TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	WORKSHOP EPP	UFWL	IMB	SPARE	STABLING YARD-2	WORKSHOP 60KVA UPS	SPARE	SPARE		STABLING YARD -1	FEEDER PILLAR	ACDB--ASS	DCDB CHARGER	WORKSHOP 60KVA UPS	SPARE	SPARE

MCCB RATING IN AMPS	250 A	160 A	160 A	160 A	160 A	80 A	80 A	80 A	80 A
TRIP SETING IN AMPS	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
KVAR RATING	100 kVAR	50 kVAR	50 kVAR	50 kVAR	50 kVAR	25 kVAR	25 kVAR	25 kVAR	25 kVAR

C.B. RATING IN AMPS	250A	250A	250A	160A	160A	160A	125A	100A	80A	80A	80A	80A	80A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	WPL	SWL	BORE WELL	ACDB-1	ACDB-2	RTU	VTL	SML-2	SML-3 (2 Nos.)	STU	SPARE	SPARE	SPARE
CONNECTED LOAD IN KW	110 KW	30 KW	110.7 KW	56.8 KW	41.6 KW	30 KW	30 KW	30KW	30KW	25KW			

C.B. RATING IN AMPS	630A	100A	100A	100A	32A	32A	40A	40A	100A	630A	100A	100A	40A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	SDB-1 PANEL	Compressor -1	EOT CRANE 1ST (2 Nos.)	EOT CRANE 1ST (2 Nos.)	EOT CRANE 1 ST	EOT CRANE 1 ST	3PY Transformer	3PU Transformer	SML-1	SPARE	SPARE	SPARE	SPARE
CONNECTED LOAD IN KW	245.2 KW	30 KW	40 KW	40 KW	6 KW	6 KW	12 KW	12 KW	30KW				

C.B. RATING IN AMPS	250A	160A	160A	160A	160A	80A	80A	80A	80A
TYPE	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
FEEDER DESCRIPTION	ELDB-01 (UFSB)	ELDB-01 (SWD)	Compressor	SPARE	SPARE				
CONNECTED LOAD IN KW	0.4	2.5	20 kW	0.41 KW					

C.B. RATING IN AMPS	20A	20A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	LDB-1	LDB-2	LDB-3	LDB-4	LDB-5	LDB-6	LDB-7	LDB-8	LDB-9	LDB-10	LDB-11	LDB-12	LDB-13	FDB VTP/LDB	SPARE	SPARE	SPARE								
CONNECTED LOAD IN KW	4.3 KW	2.1 KW	5.4 KW	4.4 KW	14.8 KW	15.4 KW	6.1 KW	12 KW	12 KW	8.3 KW	8.6 KW	4.4KW	11KW	15.1 KW											

C.B. RATING IN AMPS	63A	63A	63A	63A	63A	63A	63A	63A	63A	63A	125A	125A	125A	125A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	PDB-1	PDB-2	PDB-3	PDB-4	PDB-5	PDB-6	PDB-7	PDB-8	SPARE	SPARE				
CONNECTED LOAD IN KW	24 KW	20 KW	21.3 KW	22.1 KW	16.4 KW	21.4 KW	60 KW	60KW						

C.B. RATING IN AMPS	100A	80A	32A	40A	40A	40A	40A	100A	63A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	Compressor -2	ESDB-1 PANEL	ACDB-3	LIFT	ACCESS CONTROL	LIFT	LIFT	SPARE	SPARE
CONNECTED LOAD IN KW	30	33.1	28.2	20	0.5	15 KW	15 KW		

C.B. RATING IN AMPS	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	LDB-1	LDB-2	LDB-3	LDB-4	FDB-1	FDB-2	PDB-1	PDB-2	PDB-3	LDB-5, WDB & TPL WDB	STABLING YARD-2	Compressor	EOT -1ST	LDB ASS-2	PDB ASS-2	PDB Ventilation	PDB Ventilation	ACDB-1	ACDB-2	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
CONNECTED LOAD IN KW	4.4	1.7	9.6	8.0	1.7	1.5	28.9	55.0	33.8	0.3	4.7	20.0	15.0	5.1	13.9	12.5	12.5	15	15	-	-	-	-	-	-

C.B. RATING IN AMPS	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A	32A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	LDB-5	LDB-6	FDB-3	FDB-4	PDB-4	PDB-5	PDB-6	PDB Ventilation	PDB Ventilation	ACDB-3	ACDB-4	SPARE	SPARE	SPARE	SPARE										
CONNECTED LOAD IN KW	8.0	9.0	2.2	1.7	35.2	34.6	55.0	12.5	12.5	15	15	-	-	-	-										

C.B. RATING IN AMPS	100A	80A	32A	40A	40A	40A	40A	100A	63A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	Compressor -2	ESDB-1 PANEL	ACDB-3	LIFT	ACCESS CONTROL	LIFT	LIFT	SPARE	SPARE
CONNECTED LOAD IN KW	30	33.1	28.2	20	0.5	15 KW	15 KW		

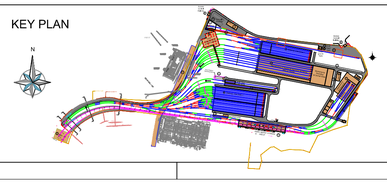
C.B. RATING IN AMPS	20A	20A	20A	32A	32A	32A	32A	40A	40A	20A	40A	20A	20A
TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	SLDB -01 Normal	SLDB -02 Normal	SLDB -03 Normal	SLDB -04 Normal	SLDB -05 Normal	STABLING YARD -3	LIFT	LIFT	ELDB-01 ASS-2	SPARE	SPARE	SPARE	
CONNECTED LOAD IN KW	5.2	1.6	2.0	2.0	0.1	2.0	15W	15W	1.3				

LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DRAWOUT AIR CIRCUIT BREAKER	MFM	MULTY FUNCTION METER
	MCCB	N T C	TRIP–NEUTRAL–CLOSE BREAKER CONTROL SWITCH
	MINIATURE CIRCUIT BREAKER	A M	AUTO/MANUAL SELECTOR SWITCH
V	VOLT METER		TRIP INDICATING LAMP
VSS	VOLT METER SELECTOR SWITCH	R	BREEAKER ON INDICATING LAMP
A	AMMETER	G	BREAKER OFF INDICATING LAMP
ASS	AMMETER SELECTOR SWITCH	W	TRIP CIRCUIT HEALTHY INDICATING LAMP
	CURRENT TRANSFORMER	B	SPRING CHARGED INDICATING LAMP
R Y B N	PHASE INDICATING LAMP	REF	RESTRICTED EARTH FAULT RELAY
MP	MICROPROSSER BASED		MECHANICAL AND ELECTRICAL INTERLOCK
TM	THERMAL MAGNETIC TYPE	LPDB	LIGHTING AND POWER DISTRIBUTION BOARD

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R1	24-08-17			Technical detail updated

KEY PLAN



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DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		
24-08-2017		

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

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: AUG-2017

TITLE: GENERAL PANEL DRAWING

DRAWING TITLE: ASS -2 MAIN SCHEMATIC DIAGRAM AARREY DEPOT

SCALE: NTS

DRAWING NO: MM3-GC-DEL-GD-8-D09-1004

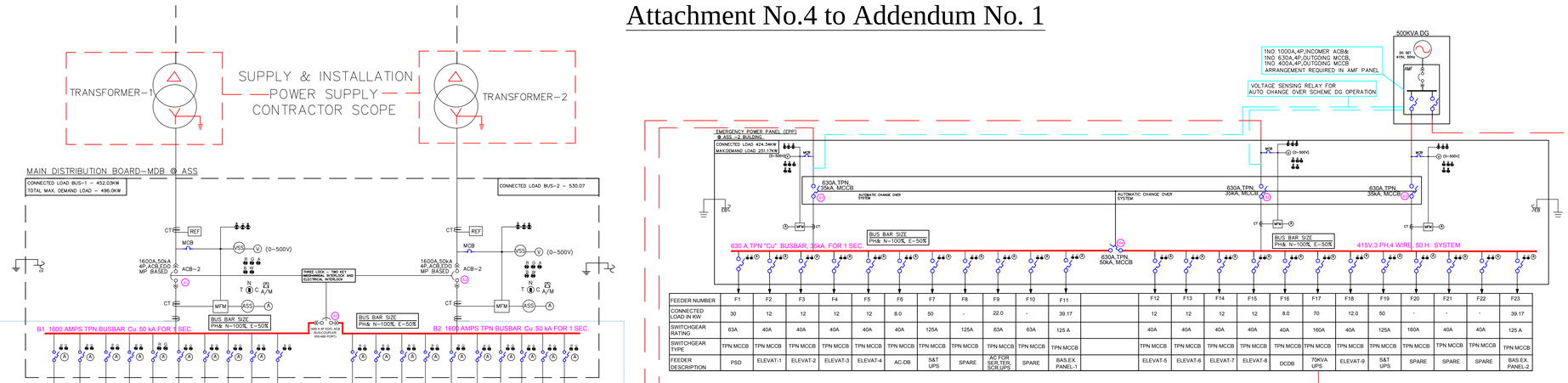
maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

Attachment No.4 to Addendum No. 1

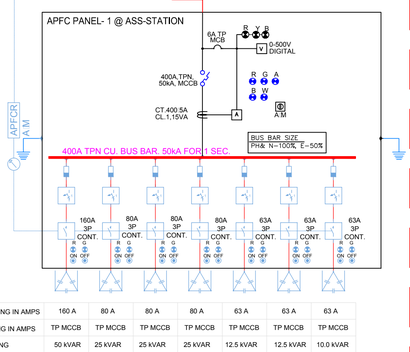
ELECTRICAL & MECHANICAL INTERLOCK AT MAIN LT PANEL(MDB) 2/3 INTERLOCK			
SL.NO	NORMAL INCOMER ACB-1(A1)	NORMAL INCOMER ACB-2(A2)	BUS COUPLER MCCB-4(B4)
1	ON	ON	OFF
2	OFF	ON	ON
3	ON	OFF	ON
4	OFF	OFF	ON

ELECTRICAL & MECHANICAL INTERLOCK AT EMERGENCY PANEL				
SL.NO	NORMAL INCOMER MCCB-1(B1)	NORMAL INCOMER MCCB-2(B2)	DG INCOMER MCCB-3(B3)	BUS COUPLER MCCB-4(B4)
1	ON	ON	OFF	OFF
2	OFF	ON	OFF	ON
3	ON	OFF	OFF	ON
4	OFF	OFF	ON	ON

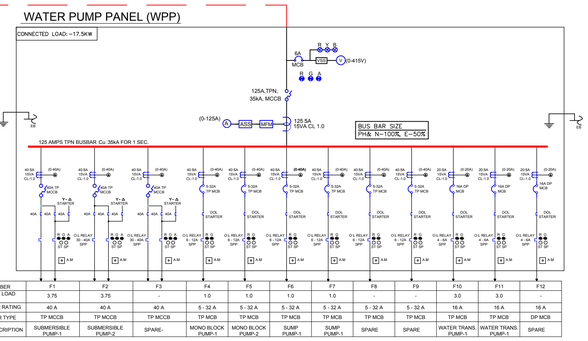


FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
CONNECTED LOAD IN kW	-	67.5	-	17.46	-	251.7	79.0	70	-	-
SWITCHGEAR RATING	400 A	200 A	160 A	125 A	200 A	630 A	160 A	160 A	400 A	200 A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	4P MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	APFC PANEL	ACPP	SPARE	WPP	SPARE	EPP	MLP	70KVA UPS	SPARE	SPARE

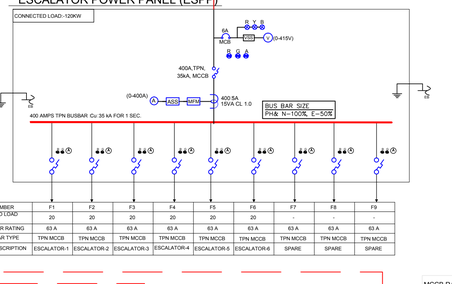
FEEDER NUMBER	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
CONNECTED LOAD IN kW	251.7	-	-	16	206	120	-	-	50	-
SWITCHGEAR RATING	630 A	630 A	200 A	100 A	400 A	400 A	200 A	200 A	400 A	400 A
SWITCHGEAR TYPE	4P MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	EPP	SPARE	SPARE	PA PANEL	FIRE PUMP PANEL	ESC.PP	SPARE	P.D AREA	SPARE	APFC PANEL



MCCB RATING IN AMPS	160 A	80 A	80 A	80 A	63 A	63 A	63 A
TRIP SETING IN AMPS	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
KVAR RATING	50 kVAR	25 kVAR	25 kVAR	25 kVAR	12.5 kVAR	12.5 kVAR	10.0 kVAR



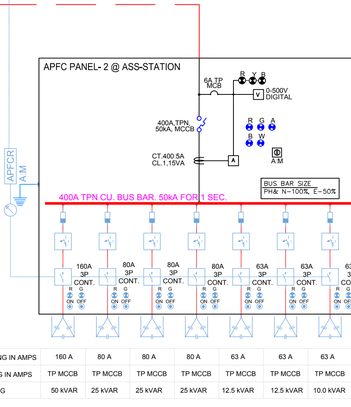
FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
CONNECTED LOAD IN kW	3.75	3.75	-	1.0	1.0	1.0	1.0	-	-	3.0	3.0	-
SWITCHGEAR RATING	40 A	40 A	40 A	5 - 32 A	5 - 32 A	5 - 32 A	5 - 32 A	5 - 32 A	5 - 32 A	16 A	16 A	16 A
SWITCHGEAR TYPE	TP MCCB	TP MCCB	TP MCCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	DP MCB
FEEDER DESCRIPTION	SUBMERSIBLE PUMP-1	SUBMERSIBLE PUMP-2	SPARE-	MONO BLOCK PUMP-1	MONO BLOCK PUMP-2	SUMP PUMP-1	SUMP PUMP-1	SPARE	SPARE	WATER TRANS. PUMP-1	WATER TRANS. PUMP-1	SPARE



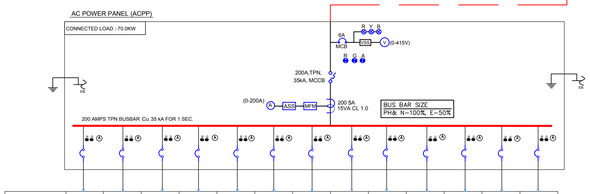
FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9
CONNECTED LOAD IN kW	20	20	20	20	20	-	-	-	-
SWITCHGEAR RATING	63 A	63 A	63 A	63 A	63 A	63 A	63 A	63 A	63 A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	ESCALATOR-1	ESCALATOR-2	ESCALATOR-3	ESCALATOR-4	ESCALATOR-5	ESCALATOR-6	SPARE	SPARE	SPARE

FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
CONNECTED LOAD IN kW	30	12	12	12	12	8.0	50	-	22.0	-	39.17
SWITCHGEAR RATING	63A	40A	40A	40A	40A	40A	125A	125A	63A	63A	125 A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	PSD	ELEVAT-1	ELEVAT-2	ELEVAT-3	ELEVAT-4	AC-DB	S&T UPS	SPARE	AC FOR SER.TER. SCR.UPS	SPARE	BAS.EX. PANEL-1

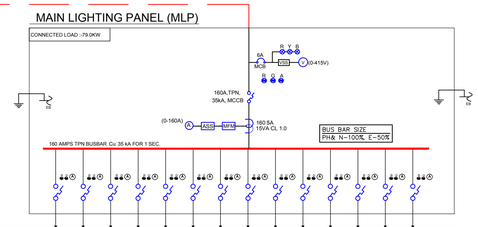
FEEDER NUMBER	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23
CONNECTED LOAD IN kW	12	12	12	12	8.0	70	12.0	50	-	-	-	39.17
SWITCHGEAR RATING	40A	40A	40A	40A	40A	160A	40A	125A	160A	40A	40A	125 A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	ELEVAT-5	ELEVAT-6	ELEVAT-7	ELEVAT-8	DCDB	70KVA UPS	ELEVAT-9	S&T UPS	SPARE	SPARE	SPARE	BAS.EX. PANEL-2



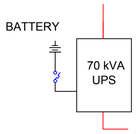
MCCB RATING IN AMPS	160 A	80 A	80 A	80 A	63 A	63 A	63 A
TRIP SETING IN AMPS	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
KVAR RATING	50 kVAR	25 kVAR	25 kVAR	25 kVAR	12.5 kVAR	12.5 kVAR	10.0 kVAR

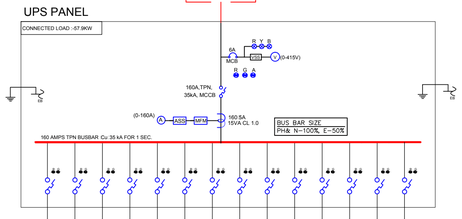


FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
CONNECTED LOAD IN kW	-	-	-	-	-	-	-	-	-	-	-	-	-
SWITCHGEAR RATING	63 A	63 A	63 A	63 A	63 A	100 A	100 A	6 A	6 A	6 A	6 A	6 A	6 A
SWITCHGEAR TYPE	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	TP MCB	DP MCB	DP MCB	DP MCB	DP MCB	DP MCB	DP MCB
FEEDER DESCRIPTION	OUT DOOR UNIT-1	OUT DOOR UNIT-2	OUT DOOR (STANDBY)	ACCB	OUT DOOR UNIT-3	OUT DOOR (STANDBY)	SPARE	FCU	SPARE	SPARE	SPARE	SPARE	SPARE

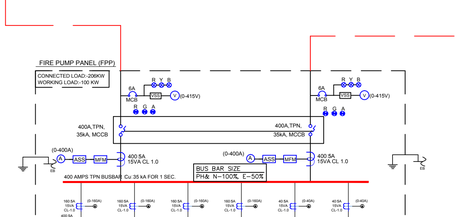


FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
CONNECTED LOAD IN kW	5.0	5.0	5.0	5.0	5.0	5.0	8.0	13.0	11.0	6.0	6.0	-	-	-	-
SWITCHGEAR RATING	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A
SWITCHGEAR TYPE	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB	TPN MCB
FEEDER DESCRIPTION	BA, LDB-1 TYPE-1	BA, LDB-2 TYPE-1	PA, LDB-1 TYPE-1	PB, LDB-1 TYPE-1	PA, LDB-3 TYPE-4	PB, LDB-4 TYPE-4	CA, LDB-1 TYPE-1	CB, LDB-2 TYPE-1	CC, LDB-1 TYPE-2	CD, LDB-2 TYPE-2	EXT, LDB-1 TYPE-3	SPARE	SPARE	SPARE	SPARE

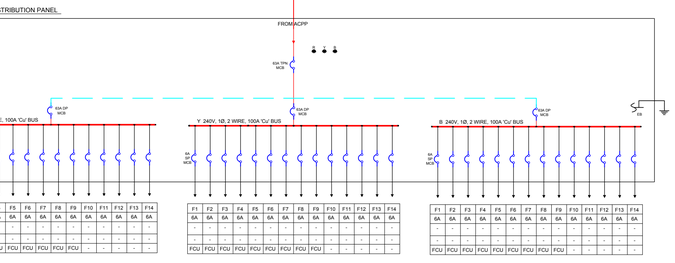




FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
CONNECTED LOAD IN kW	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	30	-	9.9	-	-
SWITCHGEAR RATING	25A	25A	25A	25A	25A	25A	25A	25A	80A	80A	25A	25A	25A	25A
SWITCHGEAR TYPE	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB	TPN MCCB
FEEDER DESCRIPTION	BA, LDB-1 TYPE-1	BA, LDB-2 TYPE-1	PA, LDB-2 TYPE-1	PB, LDB-2 TYPE-1	CA, LDB-1 TYPE-2	CB, LDB-2 TYPE-2	CC, LDB-1 TYPE-2	CD, LDB-2 TYPE-2	PSD	SPARE	OTHERS	SPARE	SPARE	



FEEDER NUMBER	F1	F2	F3	F4	F5	F6
CONNECTED LOAD IN kW	50 kW	50 kW	50 kW	50 kW	3.0 kW	3.0 kW
SWITCHGEAR RATING	160 A	160 A	160 A	160 A	40 A	40 A
SWITCHGEAR TYPE	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB	TP MCCB
FEEDER DESCRIPTION	FIRE HYDRANT-1	FIRE HYDRANT-2 (STANDBY)	FIRE SPRINKLE-1	FIRE SPRINKLE-2	JOCKEY PUMP	JOCKEY PUMP (STANDBY)



FEEDER NUMBER	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
MCB RATING IN AMPS	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A
CABLE SIZE IN S. MM /LIFE Cu	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LOAD IN WATT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CIRCUIT NO.	FCU	FCU	FCU	FCU	FCU	FCU	FCU	FCU	-	-	-	-	-	-

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
FCU	FCU	FCU	FCU	FCU	FCU	FCU	FCU	FCU	-	-	-	-	-

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A	6A
-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-
FCU	FCU	FCU	FCU	FCU	FCU	FCU	FCU	FCU	-	-	-	-	-

LEGEND

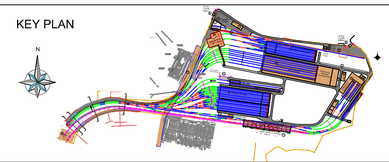
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DRAWOUT AIR CIRCUIT BREAKER	MFM	MULTY FUNCTION METER
	MCCB		TRIP-NEUTRAL-CLOSE BREAKER CONTROL SWITCH
	MINIATURE CIRCUIT BREAKER	A/M	AUTO/MANUAL SELECTOR SWITCH
V	VOLT METER		TRIP INDICATING LAMP
VSS	VOLT METER SELECTOR SWITCH		BREAKER ON INDICATING LAMP
A	AMMETER		BREAKER OFF INDICATING LAMP
ASS	AMMETER SELECTOR SWITCH		TRIP CIRCUIT HEALTHY INDICATING LAMP
	CURRENT TRANSFORMER		SPRING CHARGED INDICATING LAMP
	PHASE INDICATING LAMP	RRT	RESTRICTED EARTH FAULT RELAY
MP	MICROPROSSER BASED		MECHANICAL AND ELECTRICAL INTERLOCK
TM	THERMAL MAGNETIC TYPE	LPDB	LIGHTING AND POWER DISTRIBUTION BOARD

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R1	24-08-17			Technical Detail Updated

MMRC

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		
24-08-2017		

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: AUG-2017

TITLE: GENERAL PANEL DRAWING

DRAWING TITLE: MAIN SCHEMATIC DIAGRAM FOR AAREY STATION

SCALE: NTS

DRAWING NO: MM3-GC-DEL-GD-8-D09-1005

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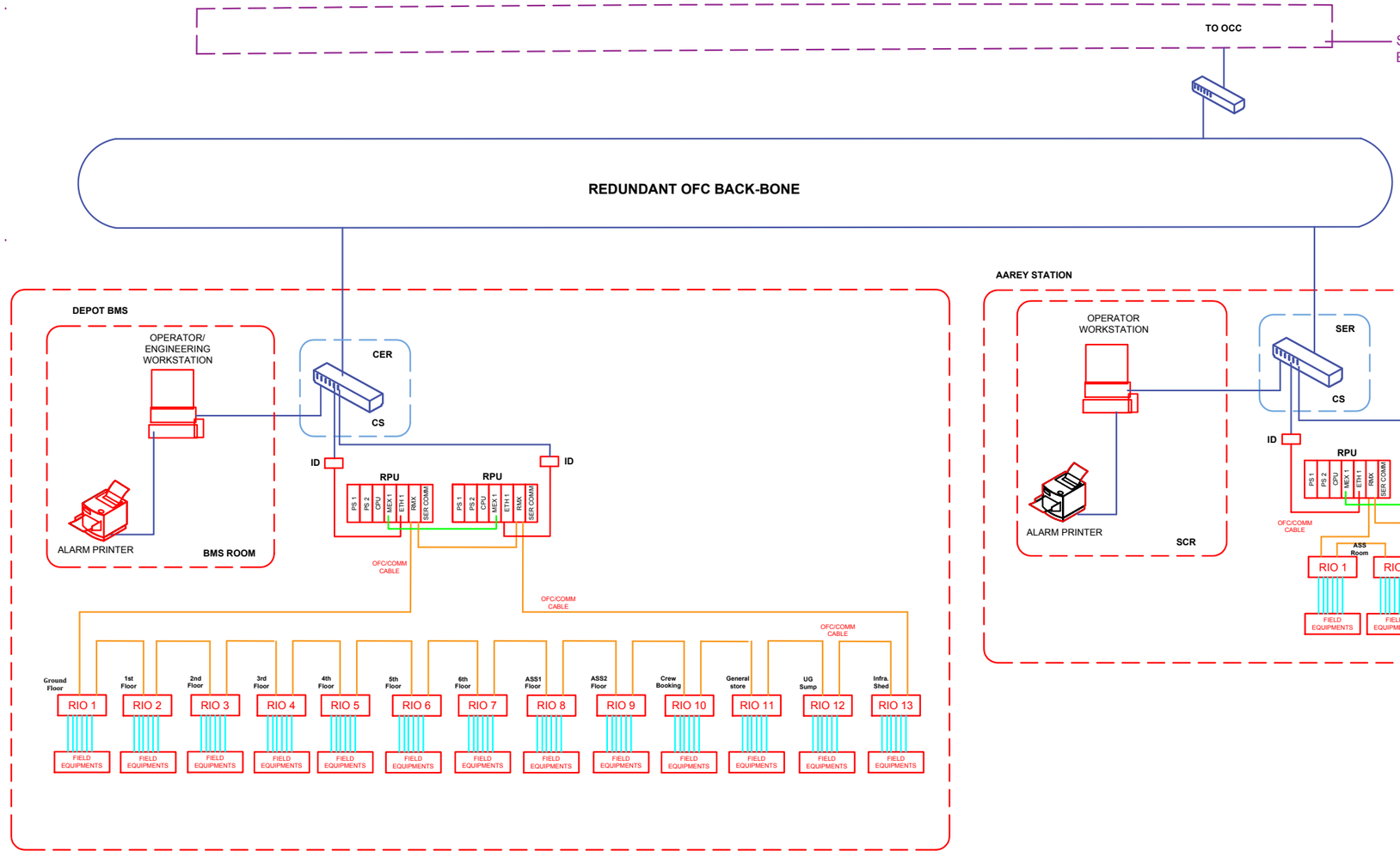
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO.4 OF ADDENDUM 1

BMS SYSTEM ARCHITECTURE



LEGENDS:

- : SCOPE OF DEPOT E & M CONTRACTOR FOR BMS
- : SCOPE OF S & T CONTRACTOR FOR BMS
- : SCOPE OF INTGRATOR CONTRACTOR FOR STATION BMS AND DEPOT BMS

RPU – REMOTE PROCESSING UNIT
OCC – OPERATION CONTROL CENTER
BCC – BACKUP CONTROL CENTER
DCC – DEPOT CONTROL CENTER
SCR – STATION CONTROL ROOM
BMS – BUILDING MANAGEMENT SYSTEM
LAN – LOCAL AREA NETWORK
FOC – FIBER OPTIC CABLE
SER – STATION EQUIPMENT ROOM
TER – TELECOM EQUIPMENT ROOM
CS – COMMUNICATION SWITCH
RMC – REDUNDANCY MESSAGE CHANNEL
RIO – REMOTE INPUT OUTPUT
ID – INTERFACE DEVICE

NOTE: -

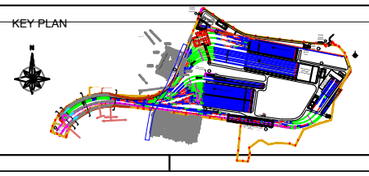
- Station Data will be available at the Redundant Server at OCC from Depot & Station
- In case of single point of network failure, the data will still be available to local Server at OCC
- In case of station isolation with OCC, data will be available locally in station
- RPU is comprise of Power Supply, Interface Modules, Control/Communication Module and Remote Input/Output Modules
- Field Equipments are the monitoring & control equipments from LV/MV Distribution System, Lighting System, Fire Alarm and Fire fighting system, Lift & Escalator, DG, UPS, Air Conditioning, Water supply and drainage system etc
- OFC/Comm cable for Remote IO network is in BMS Vendor's scope

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R1	24-08-17			Revised Drawing

MMRC

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

KEY PLAN



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APPROVED BY		

22-AUG-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: AUG-2017

TITLE: BMS GENERAL ARRANGEMENT DRAWING

DRAWING TITLE: TYPICAL BMS ARCHITECTURAL DRAWING

SCALE: NTS

DRAWING NO: MM3-GC-DBM-GD-08-D23-0001

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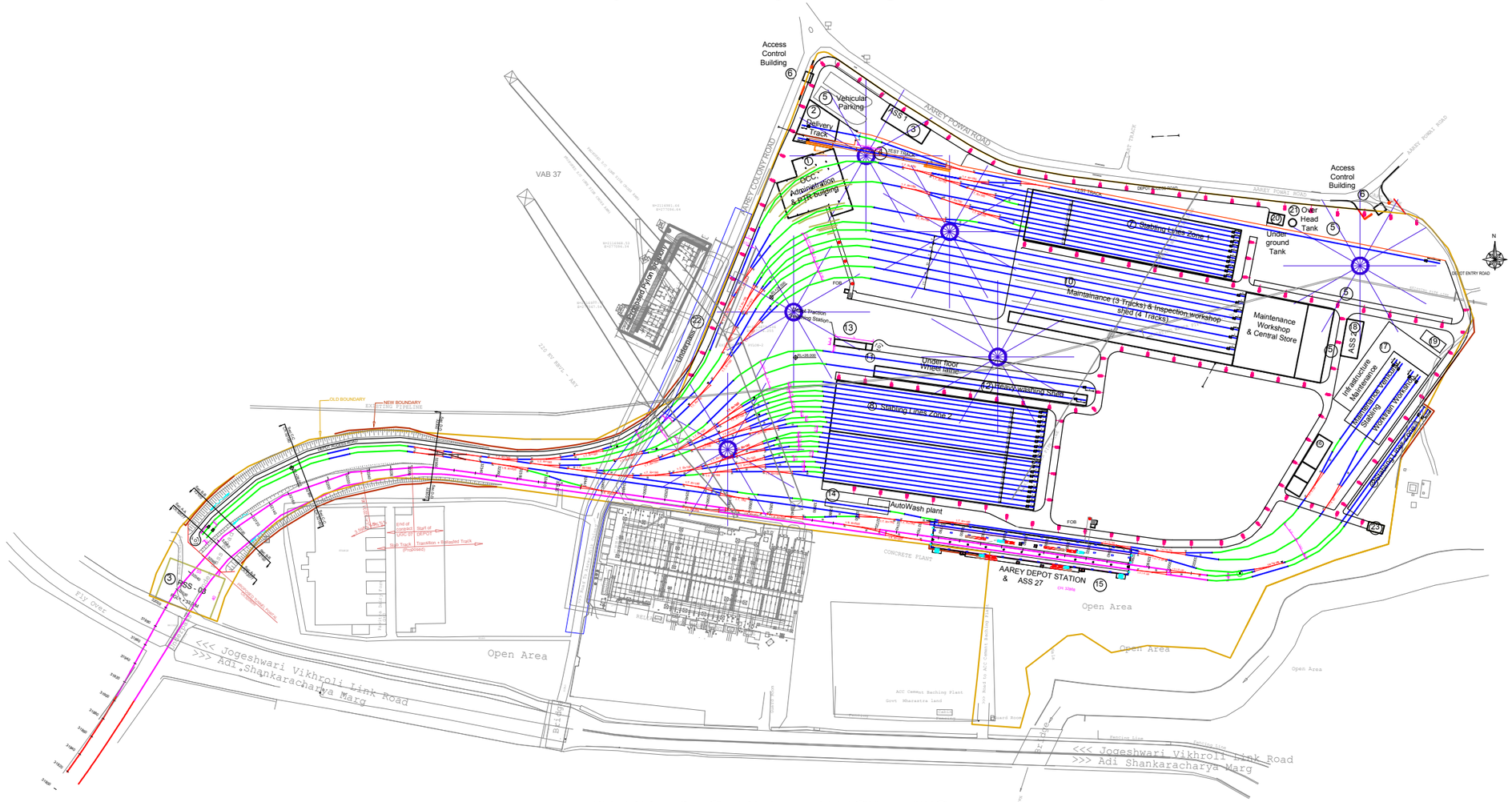
F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

MUMBAI METRO LINE 3 - AAREY DEPOT



YARD & STREET LIGHTING

HIGHMAST DETAILS :
NO OF HIGH MAST = 06 NOS.
HIGH MAST HEIGHT = 30 m
LUMINAIRE EACH MAST = 12 NOS.

Luminaire Schedule

Symbol	Qty	Label	Lum. Watts
	72	250 W LED FLOOD LIGHT	250
	124	LED Street Light - 40 W	40

Calculation Summary

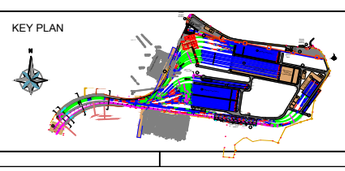
Label	Units	Avg	Max	Min	Min/Avg
STREET LIGHTING	Lux	10.00	21	4	0.40
YARD LIGHTING	Lux	25	179	5	0.20

STREET LIGHT DETAILS :
NO. OF STREET LIGHT POLES = 124 NOS.
POLE TO POLE SPACING = 25 m
STREET LIGHT POLE HEIGHT = 9 m
BRACKET LENGTH = 1.2 m
LUMINAIRE TILT = 15 deg.

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL LAYOUT
DRAWING TITLE: TYPICAL YARD & STREET LIGHTING AAREY DEPOT
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1006

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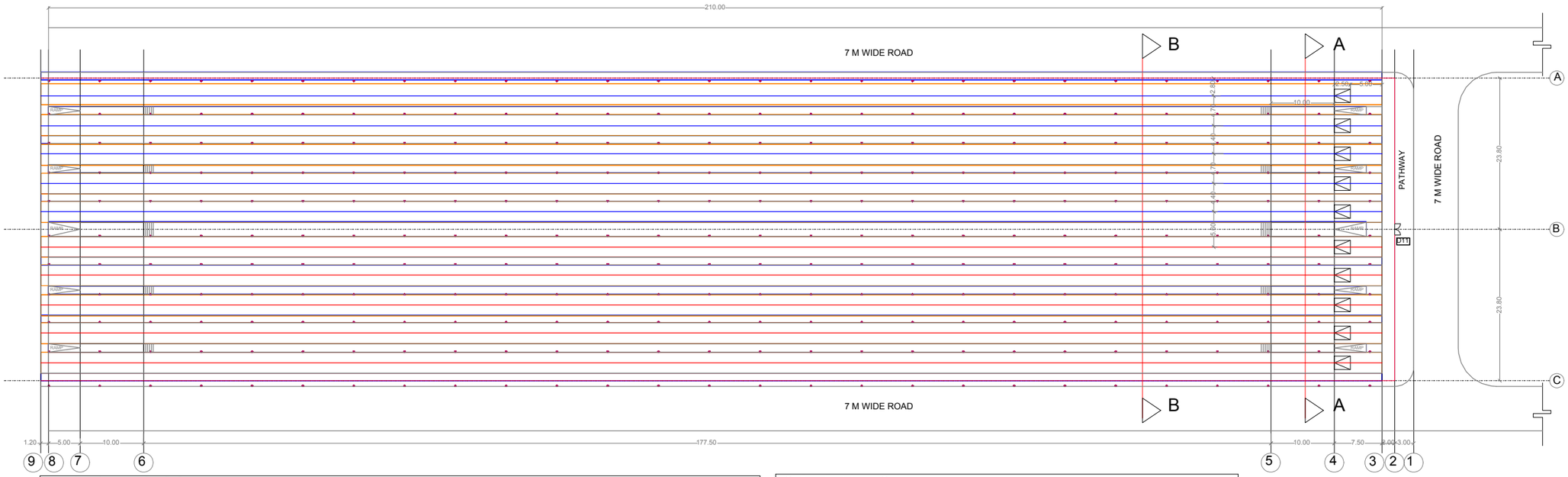
F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

STABLING SHED



Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
⊙	LED Stand Mounted Fixture	297	28	8316

Calculation Summary		
Label	Units	Avg
SERVICES RAMP STABLING	Lux	25
WALKWAY	Lux	25

POINT TO BE NOTED :

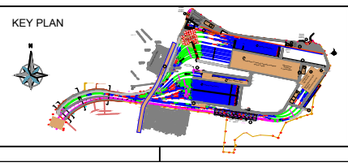
1. Mounting height shall be at Gnd Lvl between ramp + walkway egde
2. Avg lux level shown is tentative for walkway + ramp lighting of stabling area.
3. We have considered obstructions of train & ramp also.
4. The luminaire's anchor plate is mounted in between centre line of track & ramp after considering the available space between train & ramp.
5. The minimum luminaire height shall be in compliance with schedule of dimension(Train SOD),so that it should not obstruct train & servicing person movements from both ends.
6. Min. IP should be IP 65
7. Any changes in fixture design shall be disscussed with GC or refer specs.

REV.	DATE	PREP.	APPROVED	DESCRIPTION

MMRC

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

KEY PLAN



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DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

01-SEP-2017

PROJECT	MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE	SEP-2017
TITLE	TYPICAL DRAWING
DRAWING TITLE	TYPICAL LIGHTING STABLING SHED
SCALE	NTS
DRAWING NO	MM3-GC-DEL-GD-08-D09-1007

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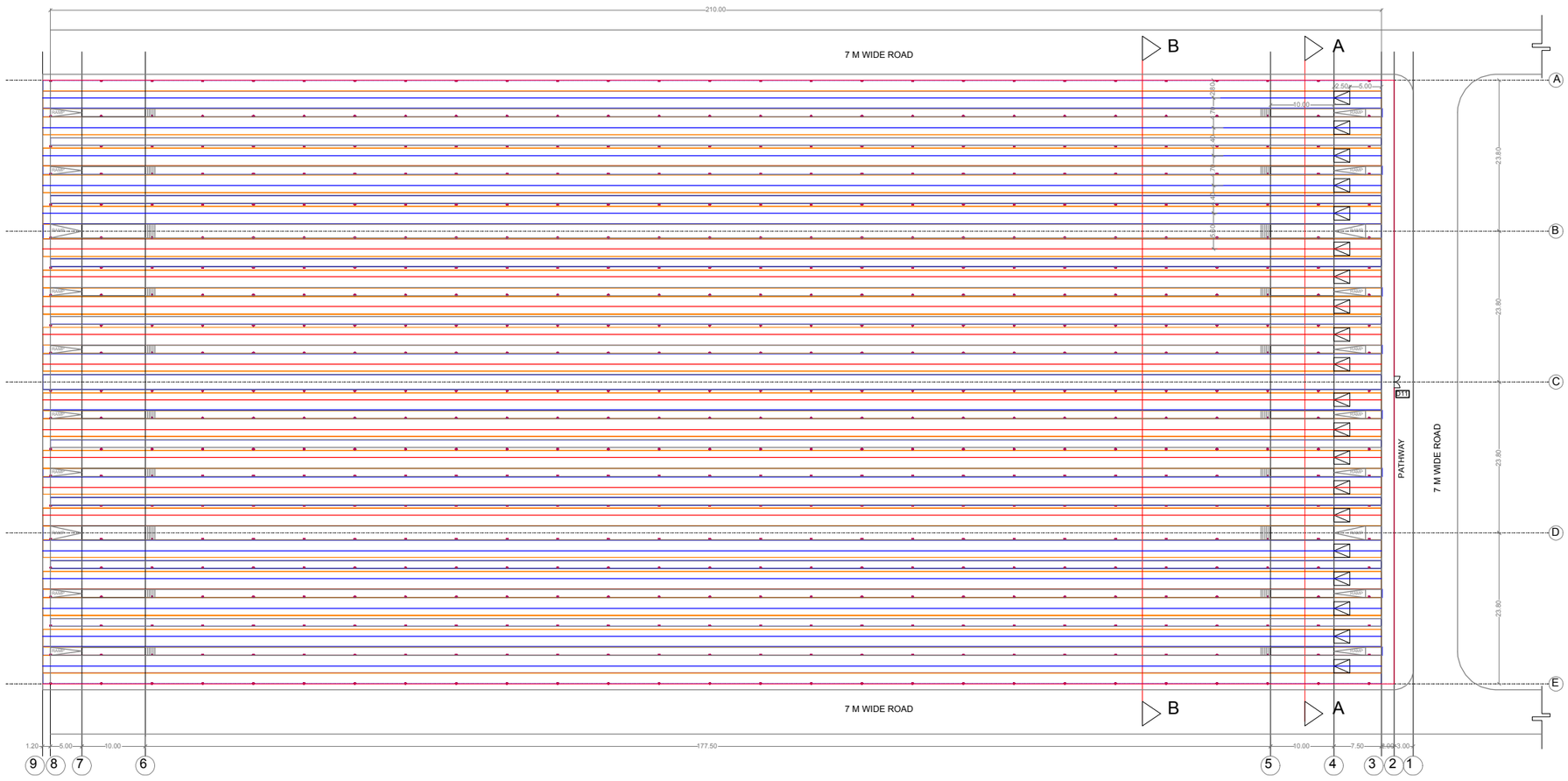
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

STABLING SHED 2



Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
⊙	LED Stand Mounted Fixture	567	28	15876

Calculation Summary		
Label	Units	Avg
RAMP	Lux	25
WALKWAY	Lux	25

POINT TO BE NOTED :

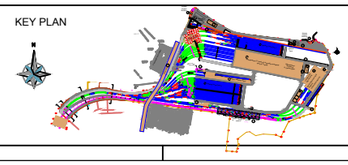
1. Mounting height shall be at Gnd Lvl between ramp + walkway egde
2. Avg lux level shown is tentative for walkway + ramp lighting of stabling area.
3. We have considered obstructions of train & ramp also.
4. The luminaire's anchor plate is mounted in between centre line of track & ramp after considering the available space between train & ramp.
5. The minimum luminaire height shall be in compliance with schedule of dimension(Train SOD),so that it should not obstruct train & servicing person movements from both ends.
6. Min. IP should be IP 65
7. Any changes in fixture design shall be disscussed with GC or refer specs.

REV.	DATE	PREP.	APPROVED	DESCRIPTION

MMRC

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

KEY PLAN



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DESIGN BY		
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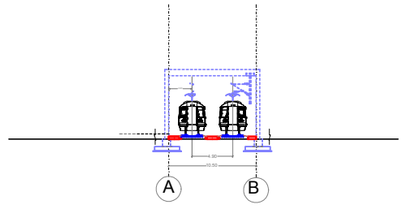
APPROVED BY		

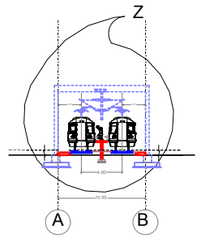
01-SEP-2017

PROJECT	MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ		DATE: SEP-2017
TITLE	TYPICAL DRAWING	DRAWING TITLE: TYPICAL LIGHTING STABLING SHED	SCALE: NTS
DRAWING NO	MM3-GC-DEL-GD-08-D09-1008		

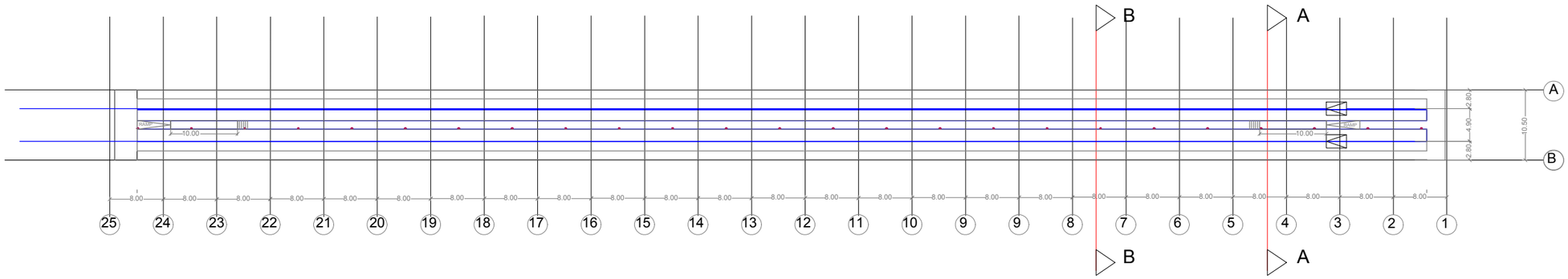
maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A





STABLING SHED 3



Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
⊙	LED Stand Mounted Fixture	25	28	700

Calculation Summary		
Label	Units	Avg
WALK WAY	Lux	21.78

POINT TO BE NOTED :

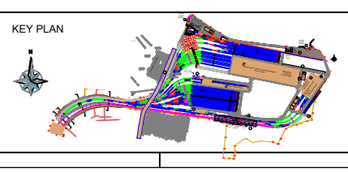
1. Mounting height shall be at Gnd Lvl between ramp + walkway egde
2. Avg lux level shown is tentative for walkway + ramp lighting of stabling area.
3. We have considered obstructions of train & ramp also.
4. The luminaire's anchor plate is mounted in between centre line of track & ramp after considering the available space between train & ramp.
5. The minimum luminaire height shall be in compliance with schedule of dimension(Train SOD),so that it should not obstruct train & servicing person movements from both ends.
6. Min. IP should be IP 65
7. Any changes in fixture design shall be disscussed with GC or refer specs.

REV.	DATE	PREP.	APPROVED	DESCRIPTION

MMRC

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

KEY PLAN



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01-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: TYPICAL DRAWING

DRAWING TITLE: TYPICAL LIGHTING STABLING SHED

SCALE: NTS

DRAWING NO: MM3-GC-DEL-GD-08-D09-1009

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

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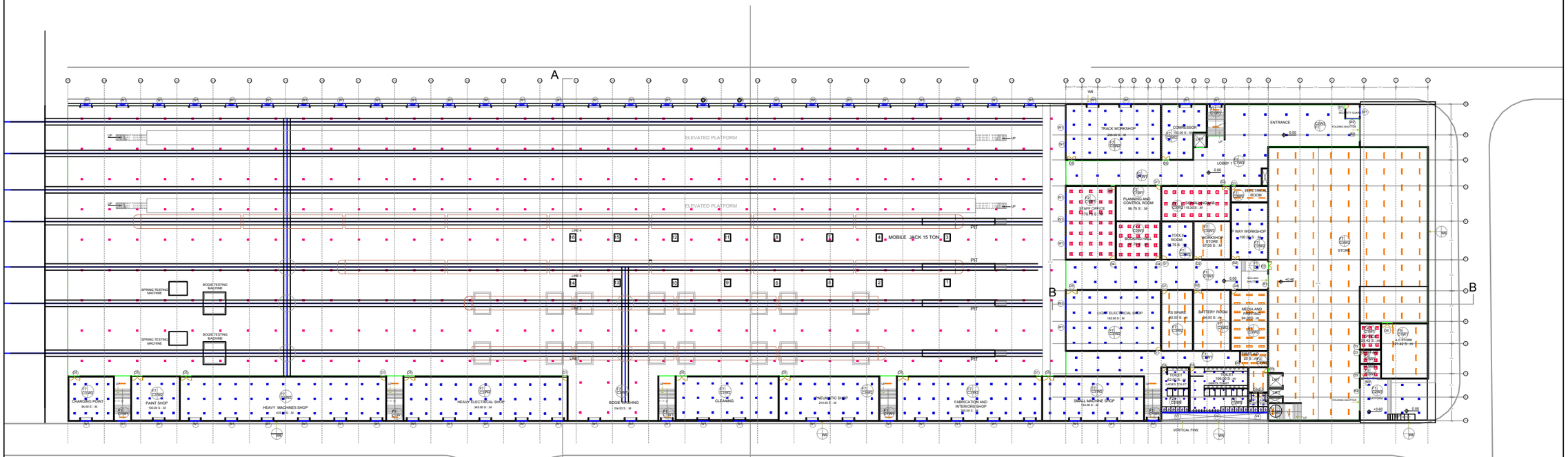
ATTACHMENT NO. 5 TO ADDENDUM 1

MAINTENANCE INSPECTION WORKSHOP & CENTRAL STORE BUILDING LIGHTING
GROUND FLOOR



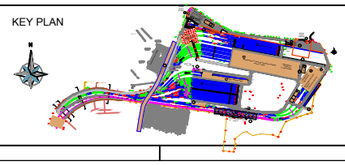
GROUND FLOOR PLAN

Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
	LED Downlighter	145	16	2320
	50 W LED HIGHBAY	423	50	21150
	28 W LED TUBE FIXTURE	237	28	6636
	28 W LED LUMINAIRE - SURFACE	27	28	756
	2 x 2 LED - Surface Mounted	475	34	16150
	200 W LED - Highbay	330	200	72600

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R0				

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

KEY PLAN



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01-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017

TITLE: DEPOT LIGHTING LAYOUT
GENERAL ARRANGEMENT

DRAWING TITLE: MAINTENANCE INSPECTION WORKSHOP & CENTRAL STORE BUILDING LIGHTING GROUND FLOOR

SCALE: 1:1000

DRAWING NO: MM3-GC-DEL-GD-08-D09-1010

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

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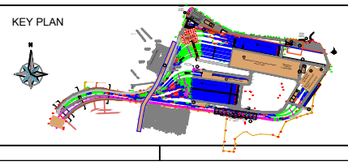
Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
AFC CCU SHOP	Lux	300	400	257	0.85
AGM	Lux	300	395	285	0.95
ASST MANAGER	Lux	300	352	300	1.00
COMPUTER LAB	Lux	300	352	300	1.00
CONFERENCE ROOM	Lux	300	422	261	0.87
CONFERNECE ROOM_	Lux	300	403	268	0.81
CONTRACT CELL ROOM	Lux	300	376	239	0.89
CONTRACTORS OFFICE	Lux	300	393	177	0.59
DCC	Lux	250	308	186	0.74
DEE	Lux	300	328	212	0.70
DGM OFFICE	Lux	300	355	296	0.98
DGM	Lux	300	405	262	0.87
DOCUMENATION AND LIBRARY	Lux	300	414	278	0.92
ELECTRONIC SHOP	Lux	250	329	156	0.63
FR	Lux	250	291	206	0.82
GENTS TOILET	Lux	150	197	138	0.92
HR DOCUMENTATION_	Lux	300	395	265	0.88
IT ROOM_	Lux	300	401	268	0.89
LADIES TOILET	Lux	150	172	146	0.97
LOBBY 2	Lux	150	196	115	0.76
MANAGER	Lux	300	352	285	0.95
OFFICE 1	Lux	300	405	258	0.86
OFFICE 2	Lux	300	437	264	0.88
OFFICE__	Lux	300	367	240	0.80
PANTRY	Lux	250	363	213	0.85
RS CONTRACTOR	Lux	300	348	204	0.68
SER	Lux	300	321	201	0.67
SKR	Lux	250	315	226	0.81
SPARE ROOM	Lux	300	328	194	0.66
SPARE ROOM_	Lux	300	374	227	0.75
SPARE_RECREATION	Lux	300	334	174	0.58
SPARE_RECREATION_	Lux	300	405	242	0.80
SPARE_ROOM	Lux	300	351	206	0.68
SR SUPERVISOR	Lux	300	352	300	1.00
STORE_	Lux	100	217	56	0.56
STORE_	Lux	100	131	37	0.37
SUPERVISORS ROOM	Lux	250	260	176	0.70
TECHNICAL CELL	Lux	300	378	226	0.75
TELECOM LAB	Lux	300	420	264	0.88
TELECOM WORKSHOP	Lux	300	420	264	0.88
TER	Lux	250	318	205	0.82
TRAINING ROOM	Lux	300	384	229	0.76
UPS ROOM	Lux	300	332	249	0.83

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R0				

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

KEY PLAN



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DESIGN BY		
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APPROVED BY		
01-SEP-2017		

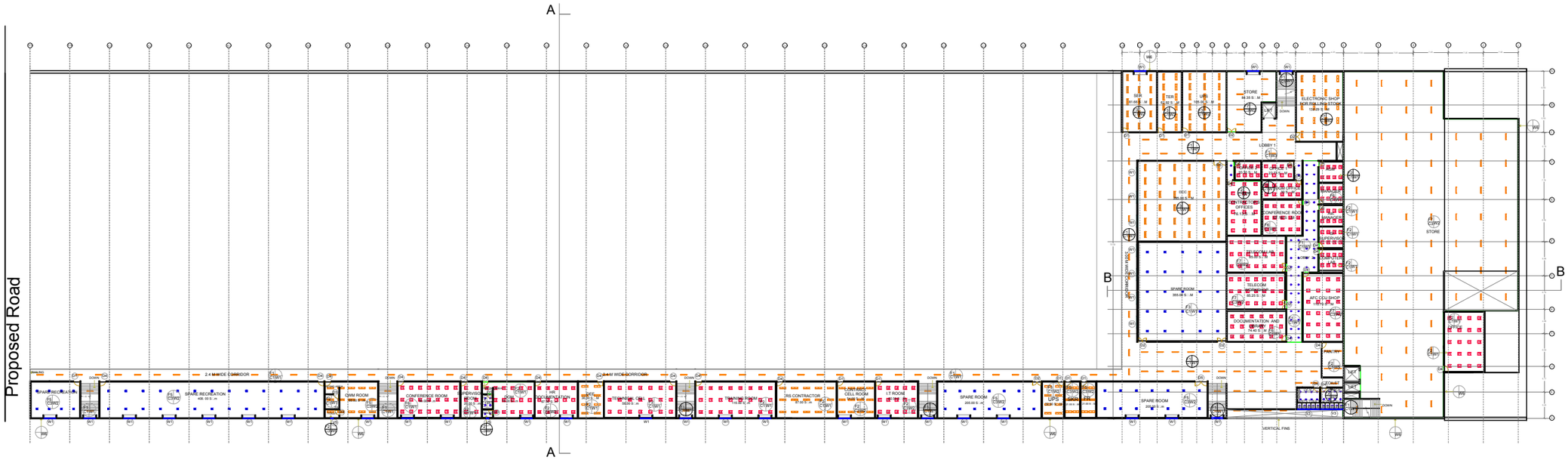
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: DEPOT LIGHTING LAYOUT GENERAL ARRANGEMENT
DRAWING TITLE: MAINTENANCE INSPECTION WORKSHOP & CENTRAL STORE BUILDING LIGHTING FIRST FLOOR TYPICAL CALCULATION SUMMARY
SCALE: 1:1000
DRAWING NO: MM3-GC-DEL-GD-08-D09-1010-11

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

MAINTENANCE INSPECTION WORKSHOP & CENTRAL STORE BUILDING
FIRST FLOOR



FIRST FLOOR PLAN

Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
	LED Downlighter	84	16	1344
	50 W LED HIGHBAY	87	50	4350
	28 W LED TUBE FIXTURE	218	28	6104
	28 W LED LUMINAIRE - SURFACE	171	28	4788
	2 x 2 LED - Surface Mounted	321	34	16150

REV.	DATE	PREP.	APPROVED	DESCRIPTION
R0				

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

KEY PLAN

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DESIGN BY		
CHECKED BY		
APPROVED BY		

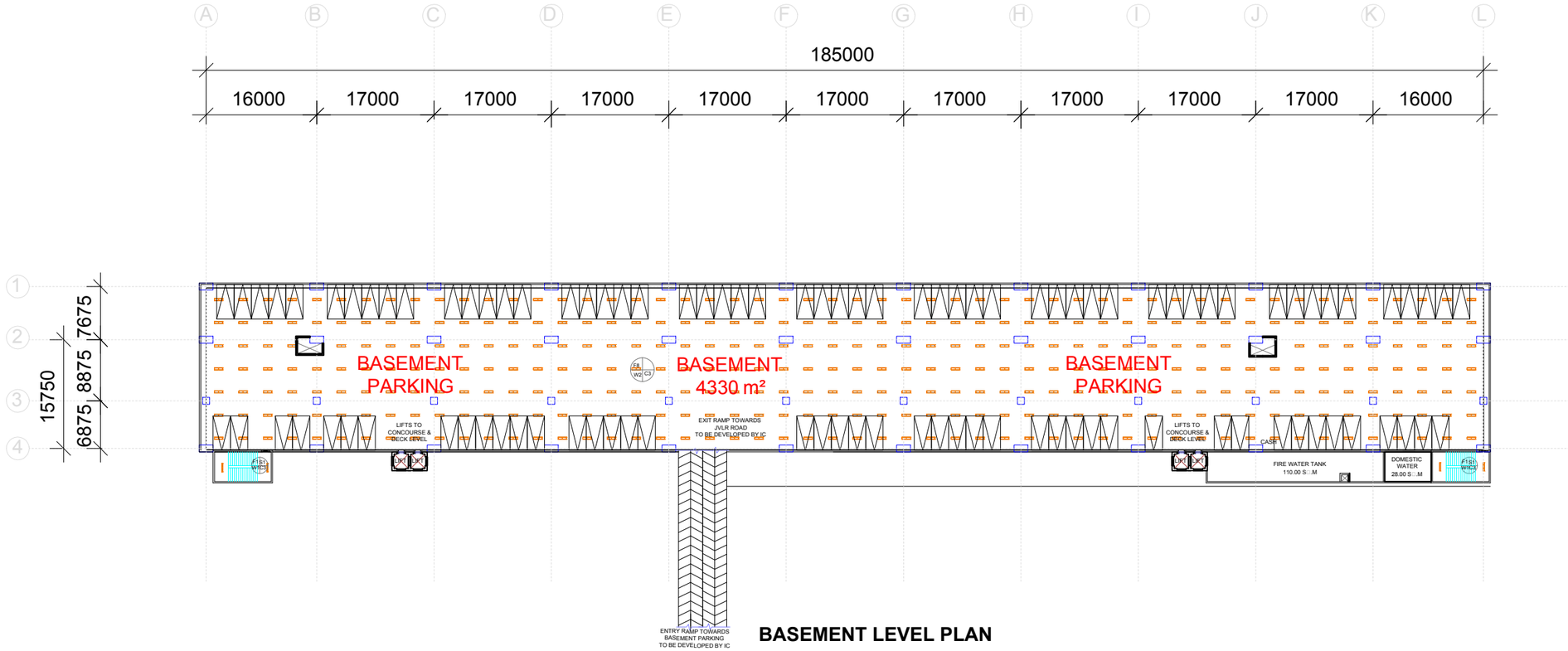
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: DEPOT LIGHTING LAYOUT GENERAL ARRANGEMENT
DRAWING TITLE: MAINTENANCE INSPECTION WORKSHOP & CENTRAL STORE BUILDING LIGHTING FIRST FLOOR
SCALE: 1:1000
DRAWING NO: MM3-GC-DEL-GD-08-D09-1011

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

01-SEP-2017

ATTACHMENT NO. 5 TO ADDENDUM 1

STATION



BASEMENT LEVEL PLAN

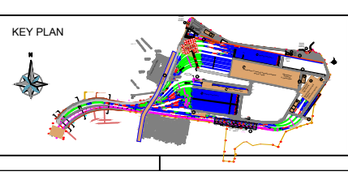
Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	28 W LED TUBE FIXTURE	4	112
	28 W LED LUMINAIRE - SURFACE	364	10192

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
BASEMENT PARKING	Lux	162.97	176	101	0.62

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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APPROVED BY		

01-SEP-2017

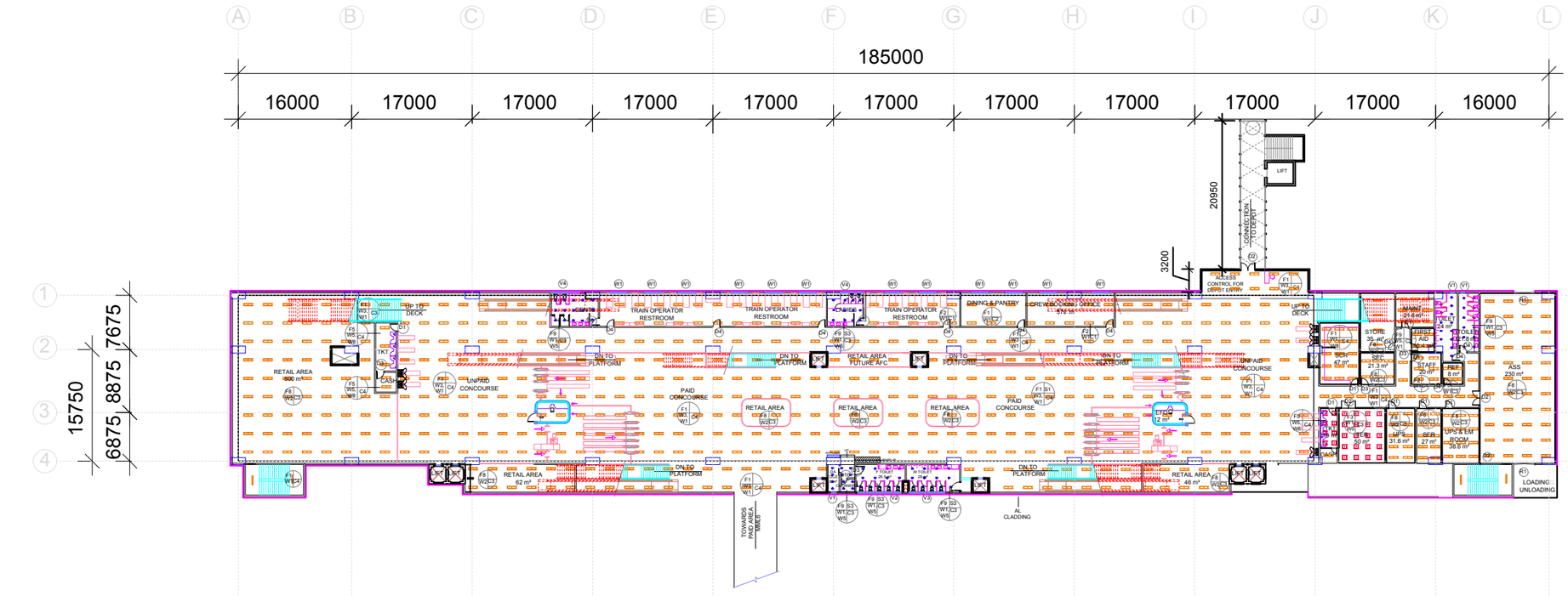
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: TYPICAL LIGHTING STATION BASEMENT
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1012

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

STATION



CONCOURSE LEVEL PLAN

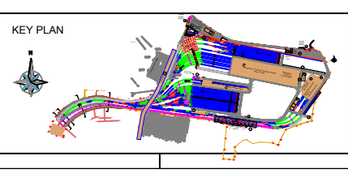
Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
ASS	Lux	293.27	347	212	0.72
CONCOURSE	Lux	313.47	355	186	0.59
FIRST AID	Lux	169.44	195	146	0.86
MAINTENANCE	Lux	245.00	279	200	0.82
REF	Lux	232.44	248	210	0.90
SCR	Lux	294.67	349	203	0.69
SEC	Lux	243.10	281	189	0.78
SER	Lux	262.38	296	196	0.75
STAFF	Lux	262.88	288	232	0.88
STORE	Lux	151.90	187	110	0.72
TER	Lux	336.50	401	245	0.73
TICKET COUNTER	Lux	187.28	213	150	0.80
UPS	Lux	259.06	299	192	0.74
UPS & EM ROOM	Lux	281.70	314	230	0.82

Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	LED Downlighter	81	1296
	28 W LED TUBE FIXTURE	8	224
	28 W LED LUMINAIRE - SURFACE	697	19516
	2 x 2 LED - Surface Mounted	28	952

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
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APPROVED BY		

01-SEP-2017

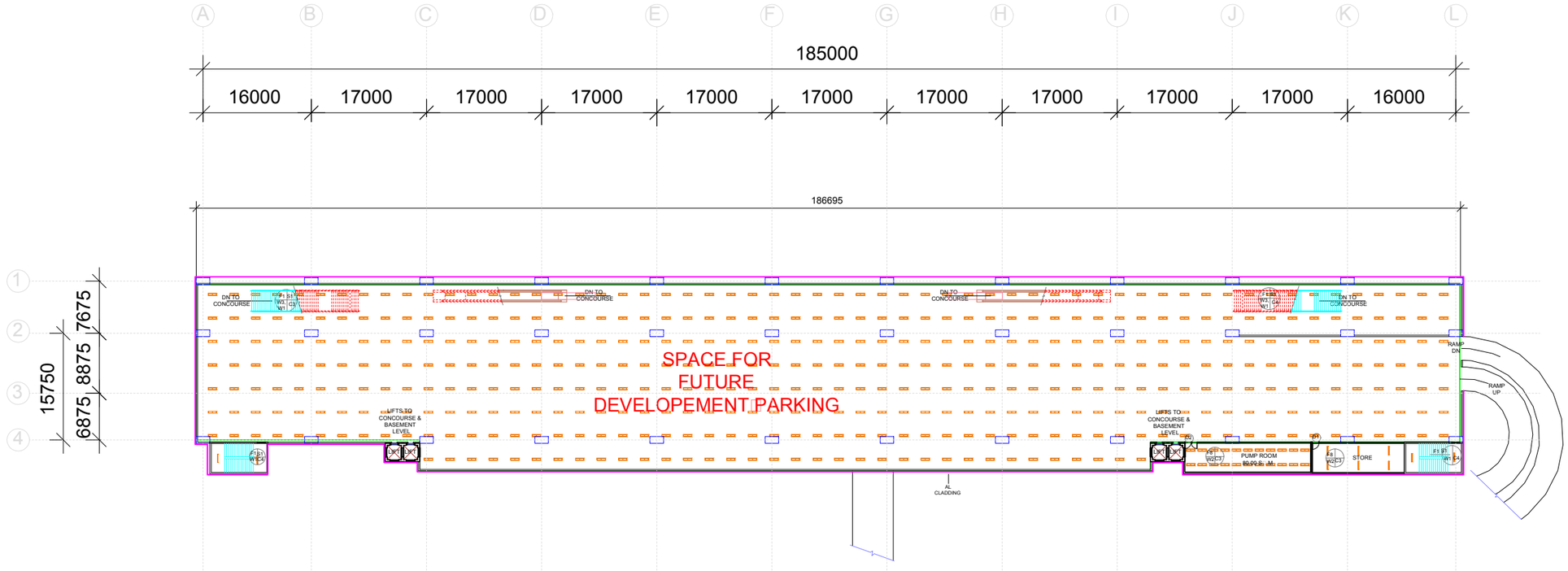
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: TYPICAL LIGHTING STATION **CONCOURSE**
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1013

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

STATION



DECK LEVEL PLAN

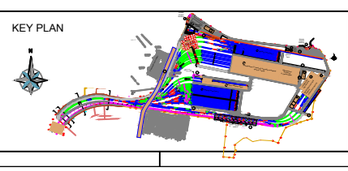
Luminaire Schedule				
Symbol	Qty	Label	Lum. Watts	Total Watts
	10	28 W LED TUBE FIXTURE	28	280
	462	28 W LED LUMINAIRE - SURFACE	28	12936

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
FUTURE PARKING_Floor	Lux	169.32	188	89	0.53
PUMP ROOM_Floor_1	Lux	215.44	239	174	0.81
STORE_Floor	Lux	166.71	187	123	0.74

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

01-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: GENERAL PANEL DRAWING

DRAWING TITLE: TYPICAL LIGHTING STATION **DECK LEVEL**

SCALE: NTS

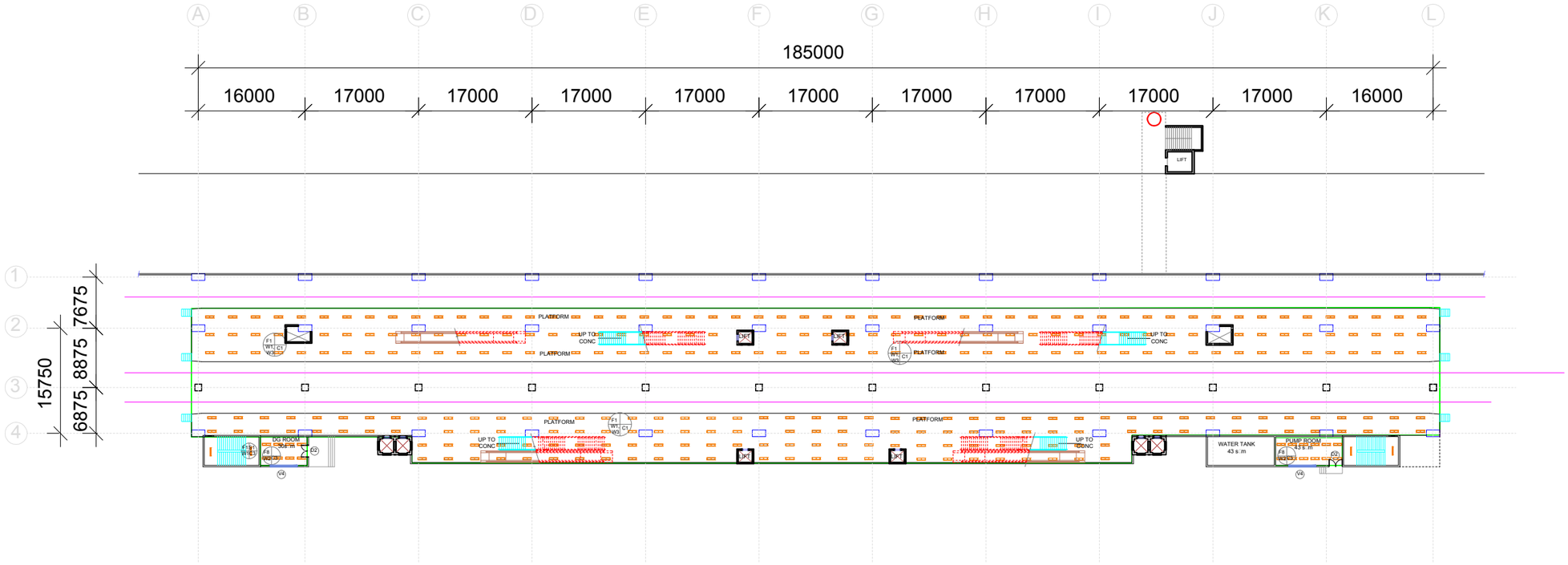
DRAWING NO: MM3-GC-DEL-GD-08-D09-1014

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ATTENDUM 1

STATION



PLATFORM LEVEL PLAN

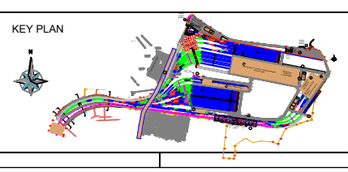
Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	28 W LED TUBE FIXTURE	4	112
	28 W LED LUMINAIRE - SURFACE	318	8904

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
D G ROOM	Lux	200	302	164	0.71
Platform	Lux	250	299	101	0.44
PUMP ROOM	Lux	200	360	196	0.68

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		
01-SEP-2017		

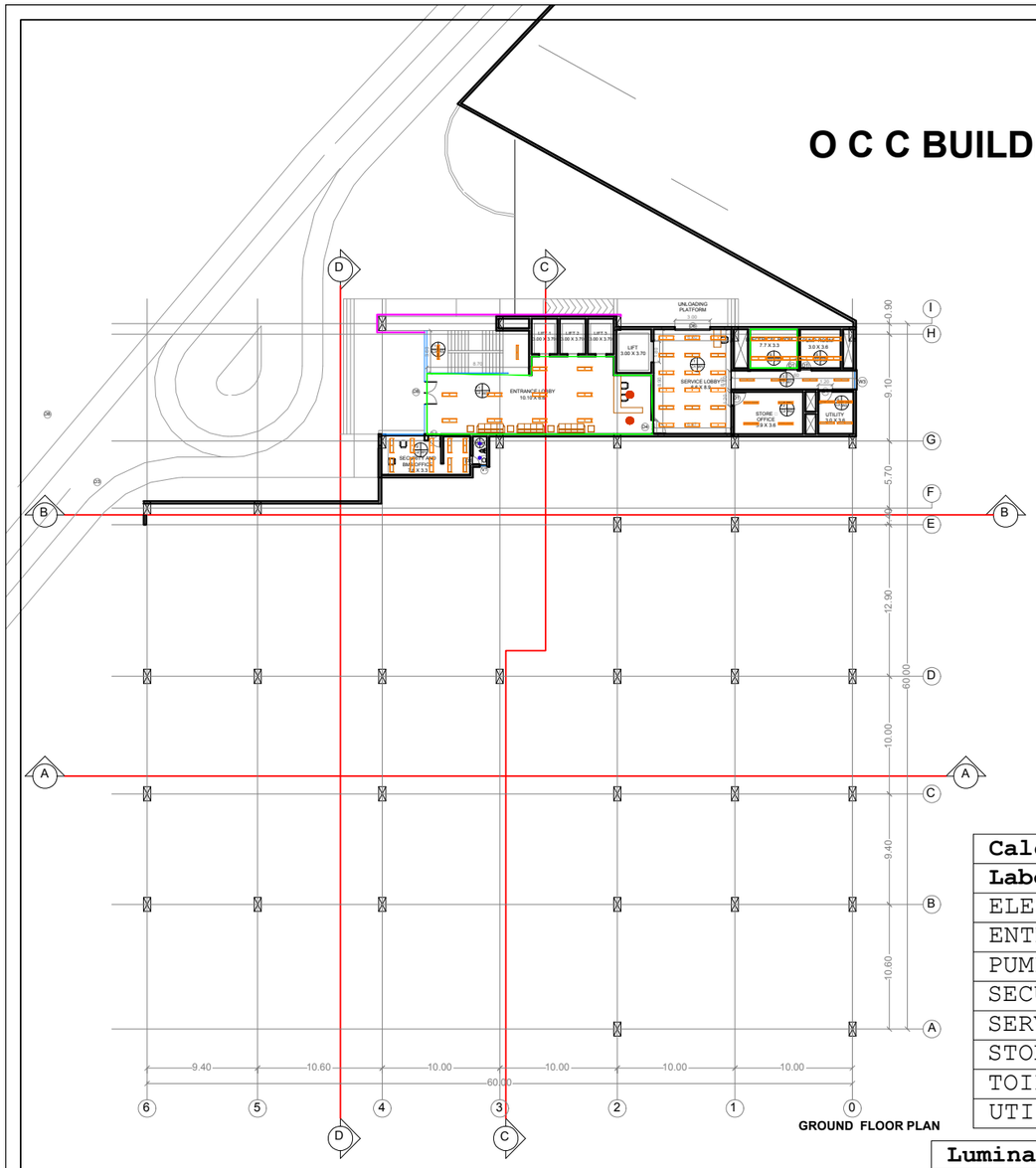
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: TYPICAL LIGHTING STATION **PLATFORM**
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1015

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

O C C BUILDING



GROUND FLOOR PLAN

Calculation Summary

Label	Units	Avg	Max	Min	Min/Avg
ELECTRICAL ROOM	Lux	310.00	349	280	0.90
ENTRANCE LOBBY	Lux	213.14	311	98	0.46
PUMP ROOM	Lux	260.44	283	248	0.95
SECURITY AND BMS OFFICE	Lux	287.92	340	215	0.75
SERVICE LOBBY	Lux	346.08	430	246	0.71
STORE_OFFICE	Lux	246.54	300	193	0.78
TOILET	Lux	113.00	113	113	1.00
UTILITY	Lux	340.25	388	299	0.88

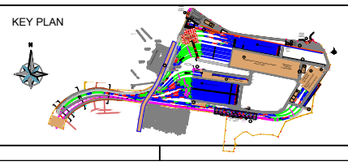
Luminaire Schedule

Symbol	Label	Qty	Lum. Watts	Total Watts
	LED Downlighter	2	16	32
	28 W LED TUBE FIXTURE	14	28	392
	28 W LED LUMINAIRE - SURFACE	50	28	1400
	Decorative LED Chandelier	2	430	860

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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FOR INFORMATION ONLY

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DESIGN BY		
CHECKED BY		
APPROVED BY		

01-SEP-2017

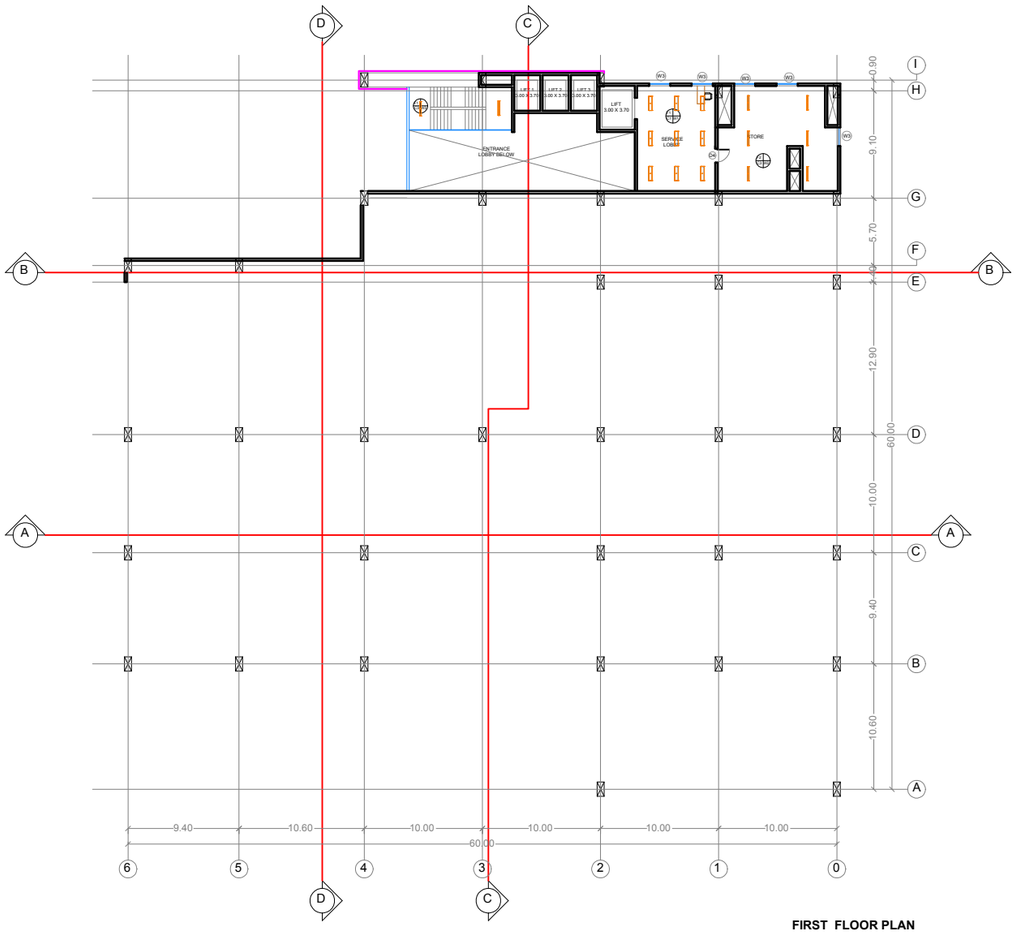
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - GROUND FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1016

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

O C C BUILDING

ATTACHMENT NO. 5 TO ADDENDUM 1



FIRST FLOOR PLAN

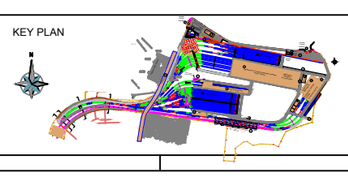
Luminaire Schedule				
Symbol	Label	Qty	Lum. Watts	Total Watts
	28 W LED LUMINAIRE - SURFACE	9	28	252
	28 W LED TUBE FIXTURE	8	28	224

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
SERVICE LOBBY	Lux	178.00	225	112	0.63
STORE	Lux	114.95	142	75	0.65

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: TYPICAL DRAWING

DRAWING TITLE: OCC - FIRST FLOOR

SCALE: NTS

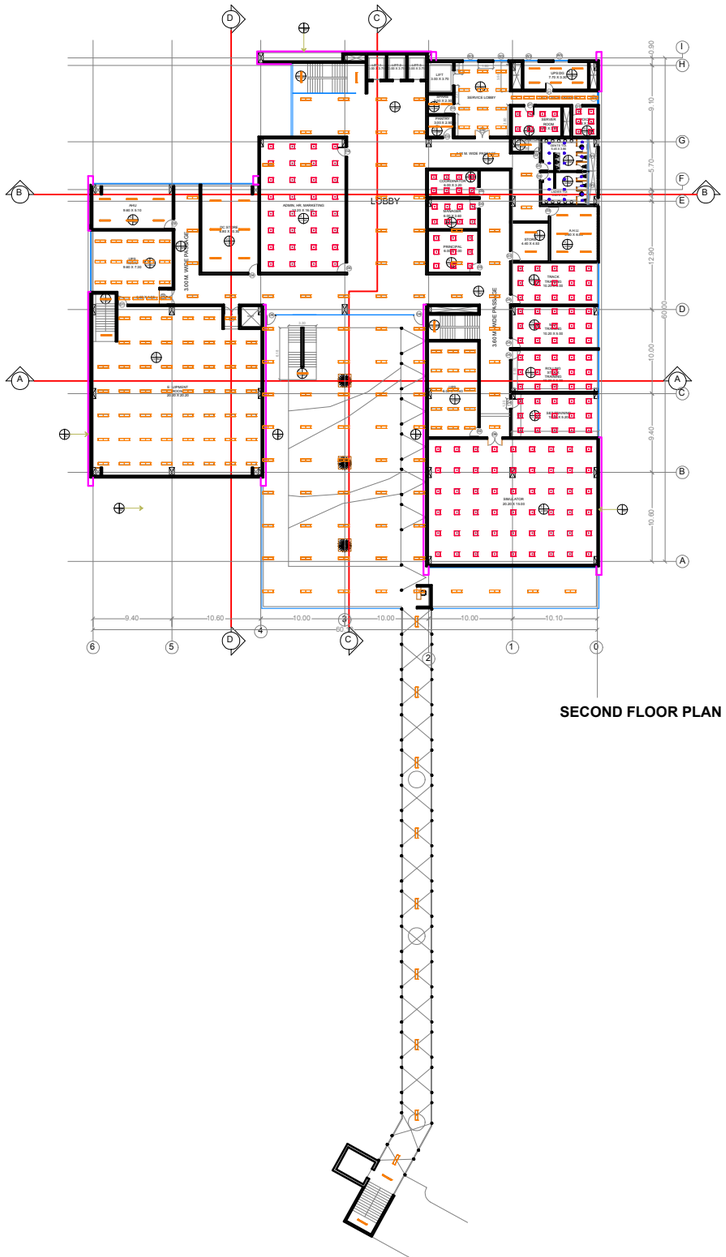
DRAWING NO: MM3-GC-DEL-GD-08-D09-1017

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

OCC BUILDING



SECOND FLOOR PLAN

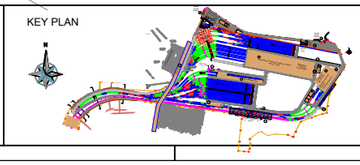
Luminaire Schedule				
Symbol	**Label**	**Qty**	**Lum. Watts**	**Total Watts**
	LED Downlighter	19	16	304
	28 W LED TUBE FIXTURE	39	28	1092
	28 W LED LUMINAIRE - SURFACE	205	28	5740
	2 x 2 LED - Surface Mounted	185	34	6290

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
ADMIN_HR_MARKETING	Lux	330.63	409	190	0.57
AHU	Lux	236.32	310	149	0.63
AHU_	Lux	386.55	500	212	0.55
CO-ORDINATOR	Lux	311.83	357	266	0.85
DC STORE	Lux	186.01	243	115	0.62
EQUIPMENT ROOM	Lux	285.61	334	121	0.42
GENTS TOILET_	Lux	145.06	196	87	0.60
LADIES TOILET		149.63	200	113	0.76
LOBBY	Lux	143.03	333	47	0.33
MANAGER	Lux	318.13	379	252	0.79
PANTRY	Lux	234.00	274	211	0.90
PRINCIPAL	Lux	357.60	424	287	0.80
S & T TRAINING	Lux	454.10	553	301	0.66
SERVER ROOM	Lux	292.50	344	237	0.81
SIMULATOR	Lux	321.27	392	177	0.55
SPARE	Lux	255.83	271	245	0.96
STORE	Lux	281.60	380	172	0.61
UPS	Lux	313.74	366	229	0.73
UPS ROOM	Lux	285.06	351	171	0.60
UPS_DG	Lux	359.38	435	265	0.74
VOICE	Lux	309.67	351	264	0.85

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

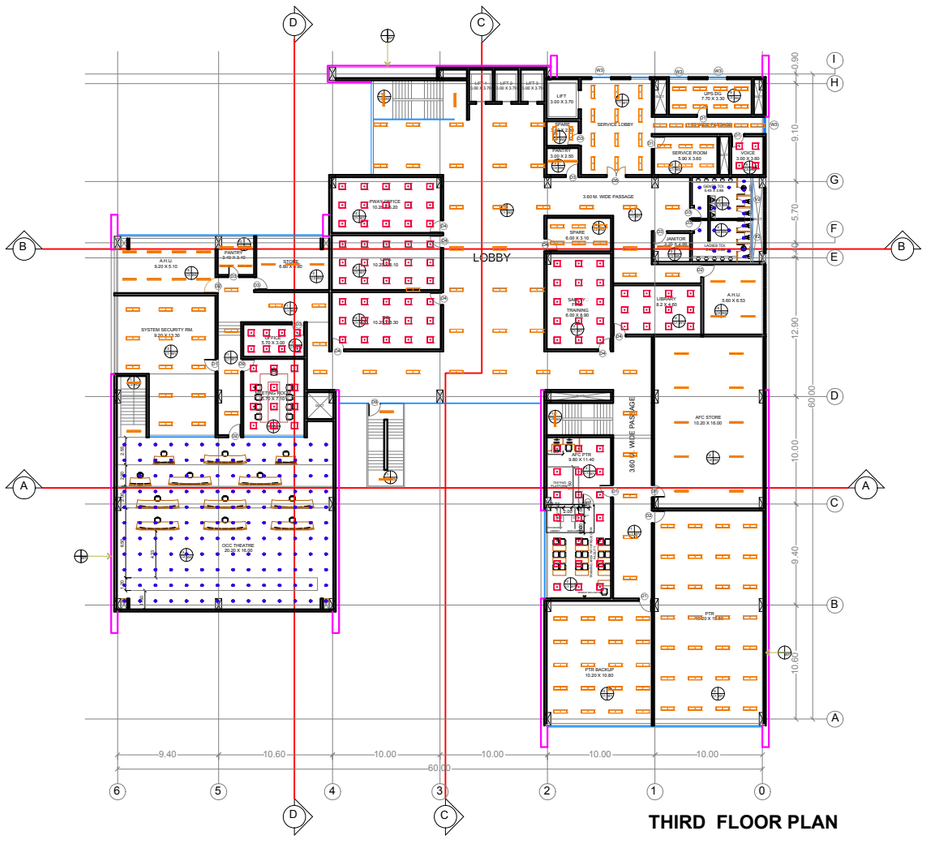
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - SECOND FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1018

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

OCC BUILDING



THIRD FLOOR PLAN

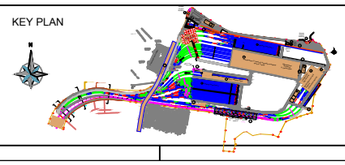
Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	LED Downlighter	173	2768
	28 W LED TUBE FIXTURE	40	1120
	28 W LED LUMINAIRE - SURFACE	161	4508
	2 x 2 LED - Surface Mounted	117	3978

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
AFC STORE	Lux	150	190	79	0.51
AHU	Lux	200	431	138	0.69
AHU_	Lux	200	261	126	0.63
CIVIL	Lux	300	519	273	0.91
DC	Lux	300	391	213	0.71
LIBRARY	Lux	300	393	250	0.83
LOBBY	Lux	150	202	106	0.70
MEETING ROOM	Lux	350	465	278	0.79
OCC THEATRE	Lux	200	242	137	0.63
OFFICE	Lux	300	378	278	0.68
PANTRY	Lux	200	529	188	0.94
PTR	Lux	250	298	138	0.56
PTR BACKUP	Lux	280	347	157	0.57
PWAY OFFICE	Lux	350	473	274	0.78
SAFETY_FIRE TRAINING	Lux	300	403	248	0.74
SERVICE ROOM	Lux	300	464	286	0.82
SPARE	Lux	250	292	215	0.86
STORE	Lux	200	309	142	0.71
TRAINING FACILITY	Lux	300	376	202	0.67

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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APPROVED BY		

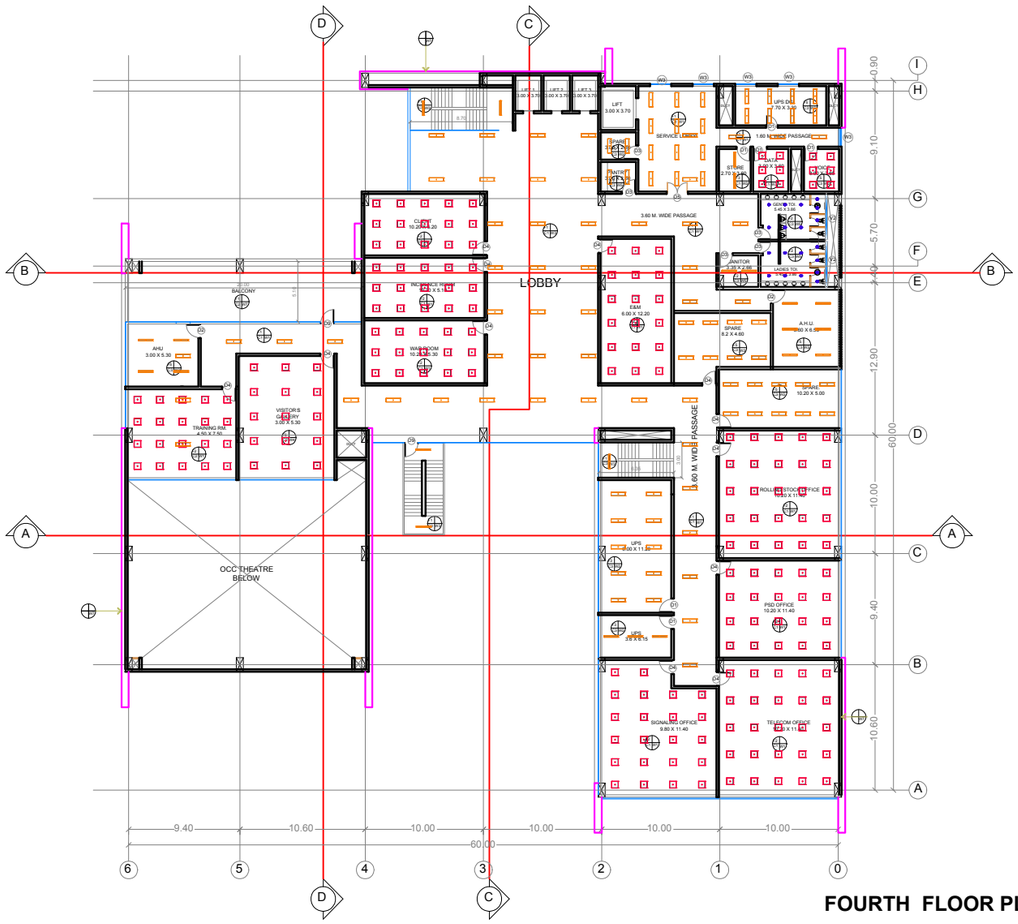
02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - THIRD FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1019

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

ATTACHMENT NO. 5 TO ADDENDUM 1

OCC BUILDING



FOURTH FLOOR PLAN

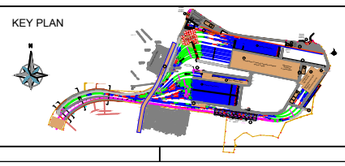
Luminaire Schedule				
Symbol	**Label**	**Qty**	**Lum. Watts**	**Total Watts**
	LED Downlighter	19	16	304
	28 W LED TUBE FIXTURE	22	28	616
	28 W LED LUMINAIRE - SURFACE	105	28	2940
	2 x 2 LED - Surface Mounted	202	34	6868

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
CLIENT	Lux	300	460	286	0.95
E & M	Lux	300	436	256	0.85
LOBBY	Lux	150	255	100	0.66
ROLLING STOCK OFFICE	Lux	300	438	243	0.81
TOILET	Lux	150	236	116	0.77
TRAINING ROOM	Lux	300	430	246	0.82
UPS	Lux	250	337	190	0.76
VISITORS GALLERY	Lux	250	291	175	0.70

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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02-SEP-2017

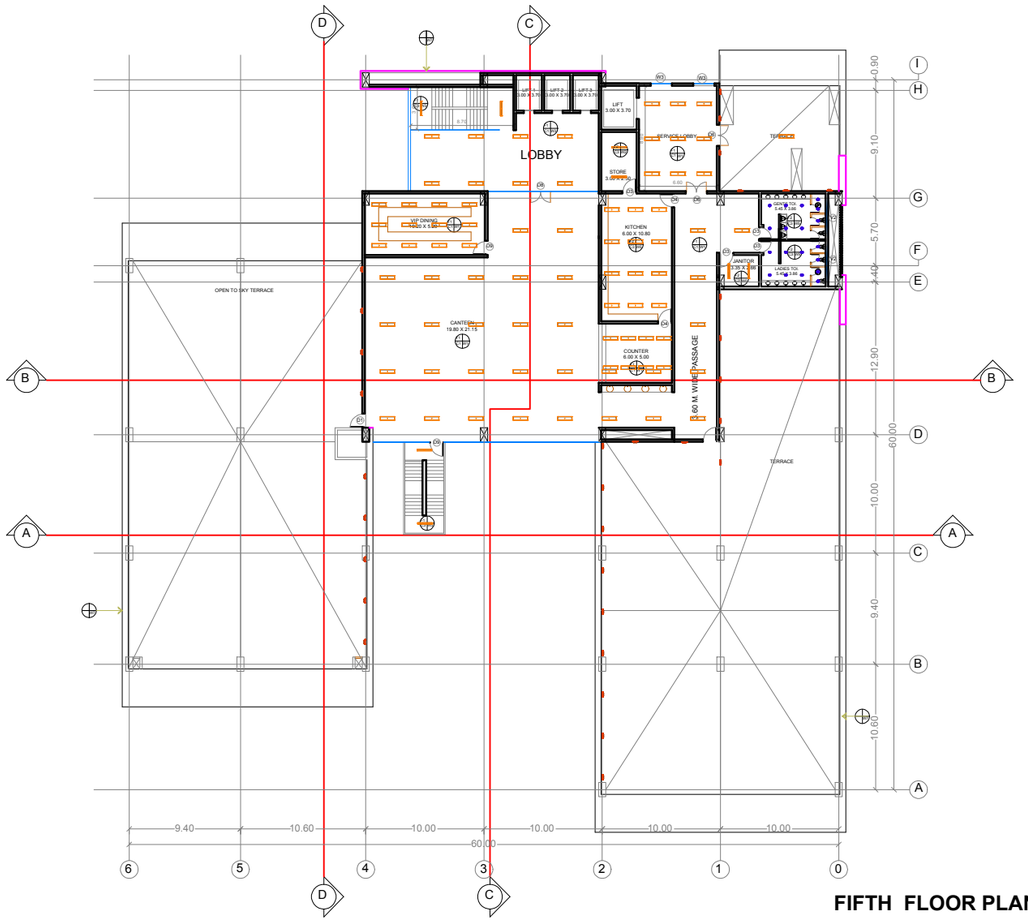
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - FOURTH FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1020

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

OCC BUILDING



FIFTH FLOOR PLAN

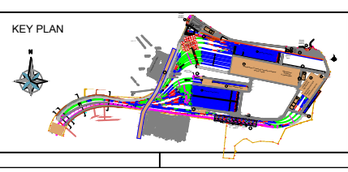
Luminaire Schedule				
Symbol	**Label**	**Qty**	**Lum. Watts**	**Total Watts**
	LED Downlighter	19	16	304
	28 W LED TUBE FIXTURE	8	28	224
	28 W LED LUMINAIRE - SURFACE	82	28	2296
	LED BULKHEAD LUMINAIRE	31	20	620

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
CANTEEN	Lux	200	184	145	0.72
COUNTER	Lux	350	445	294	0.84
KITCHEN	Lux	250	330	180	0.72
LOBBY	Lux	150	174	62	0.41
STORE	Lux	100	281	70	0.70
TOILET	Lux	150	284	135	0.90
VIP DINING	Lux	300	348	213	0.71

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
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APPROVED BY		

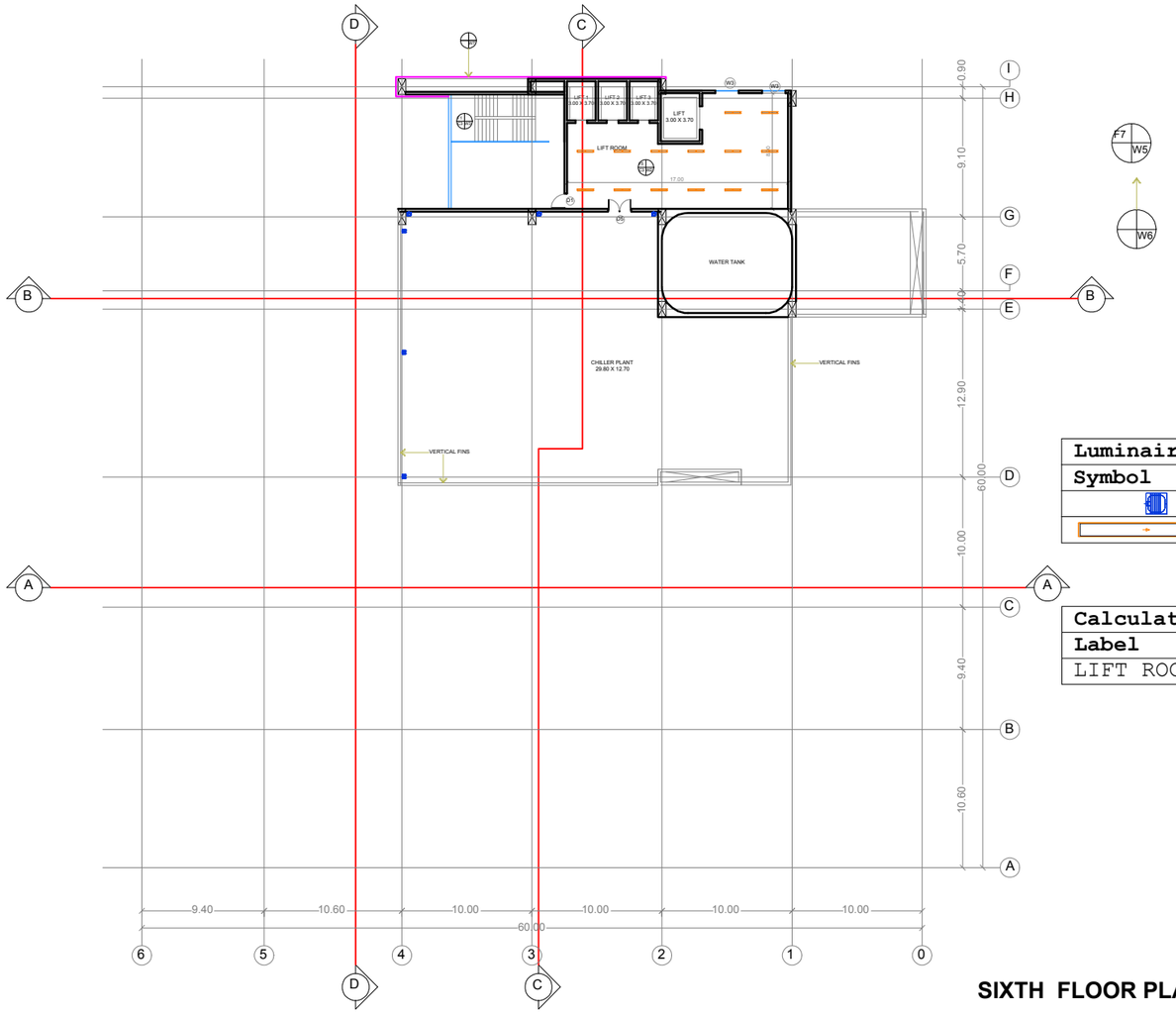
02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - FIFTH FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1021

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

ATTACHMENT NO. 5 TO ADDENDUM 1

OCC BUILDING



SIXTH FLOOR PLAN

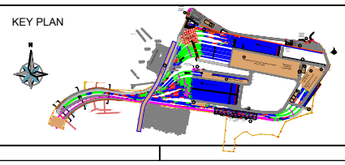
Luminaire Schedule				
Symbol	**Label**	**Qty**	**Lum. Watts**	**Total Watts**
	50 W LED FLOODLIGHT	6	50	300
	28 W LED TUBE FIXTURE	14	28	392

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
LIFT ROOM	Lux	250	329	115	0.46

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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APPROVED BY		

22-AUG-2017

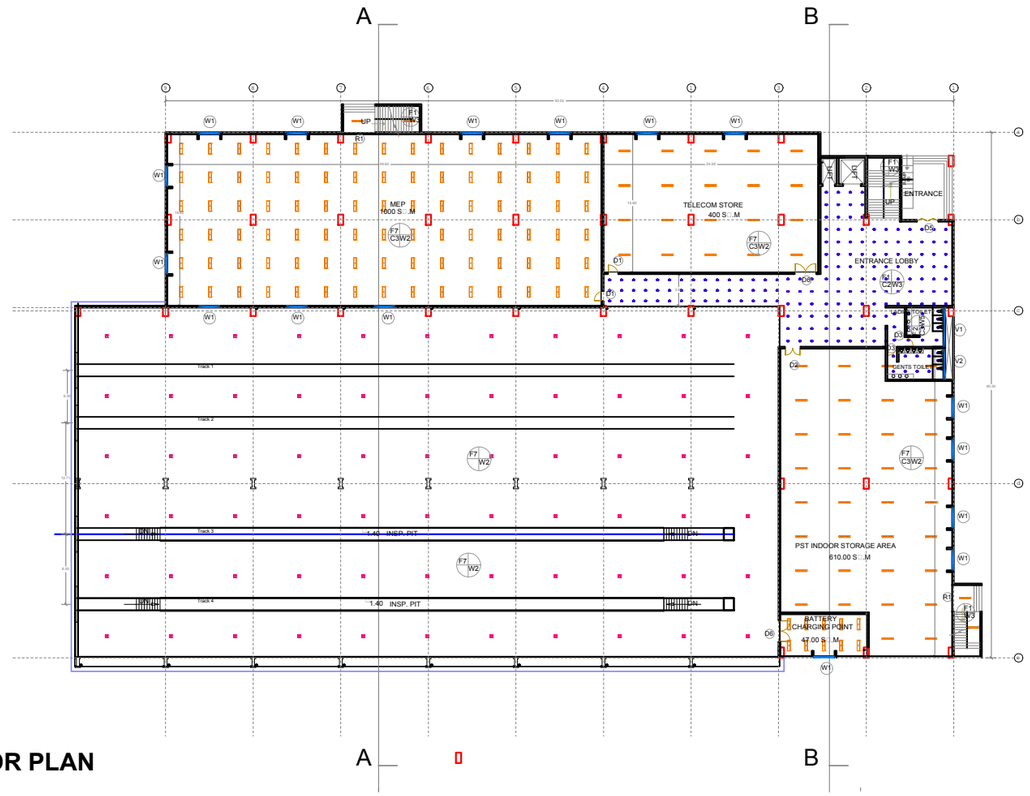
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: AUG-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: OCC - SIXTH FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1022

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

INFRA MAINTENANCE SHED



GROUND FLOOR PLAN

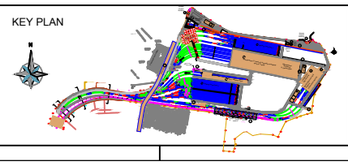
Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	LED Downlighter	194	3104
	28 W LED TUBE FIXTURE	58	1624
	28 W LED LUMINAIRE - SURFACE	100	2800
	200 W LED HIGHBAY	66	13200

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
BATTERY CHARGING POINT	Lux	250	289	233	0.89
ENTRANCE LOBBY	Lux	200	262	160	0.80
MAINTENANCE VEHICULAR STABLING	Lux	300	368	164	0.54
MEP	Lux	300	232	215	0.71
PST INDIIR STORAGE AREA	Lux	150	209	99	0.68
TELECOM STORE	Lux	150	152	97	0.74

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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02-SEP-2017

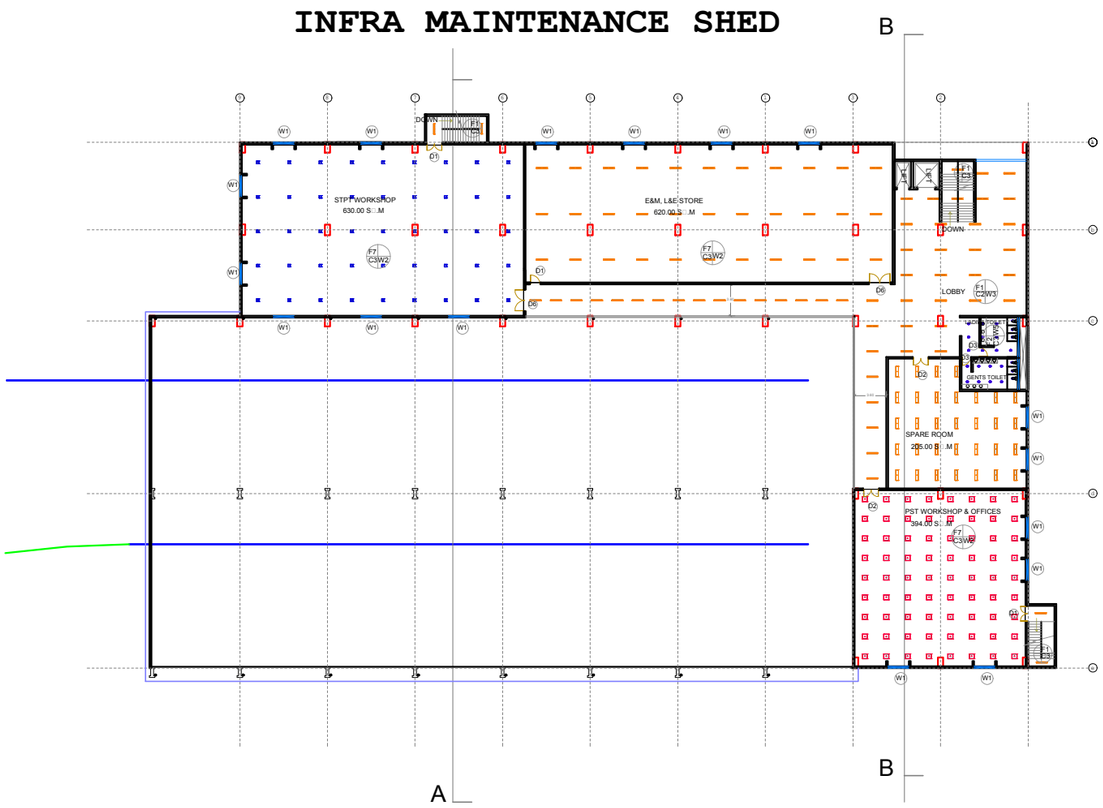
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: INFRA MAINTENANCE SHED - GROUND FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1023

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

INFRA MAINTENANCE SHED



FIRST FLOOR PLAN

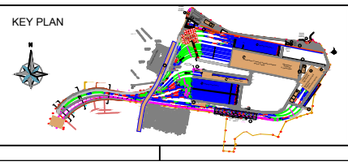
Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	LED Downlighter	24	384
	50 W LED HIGHBAY	45	2250
	28 W LED TUBE FIXTURE	89	2492
	28 W LED LUMINAIRE - SURFACE	32	896
	2 x 2 LED - Surface Mounted	72	2448

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
E & M L& E STORE	Lux	150	159	85	0.57
PST WS AND OFFICES	Lux	300	407	225	0.75
SPARE ROOM	Lux	250	331	205	0.82
STPT WORKSHOP	Lux	300	328	193	0.64

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

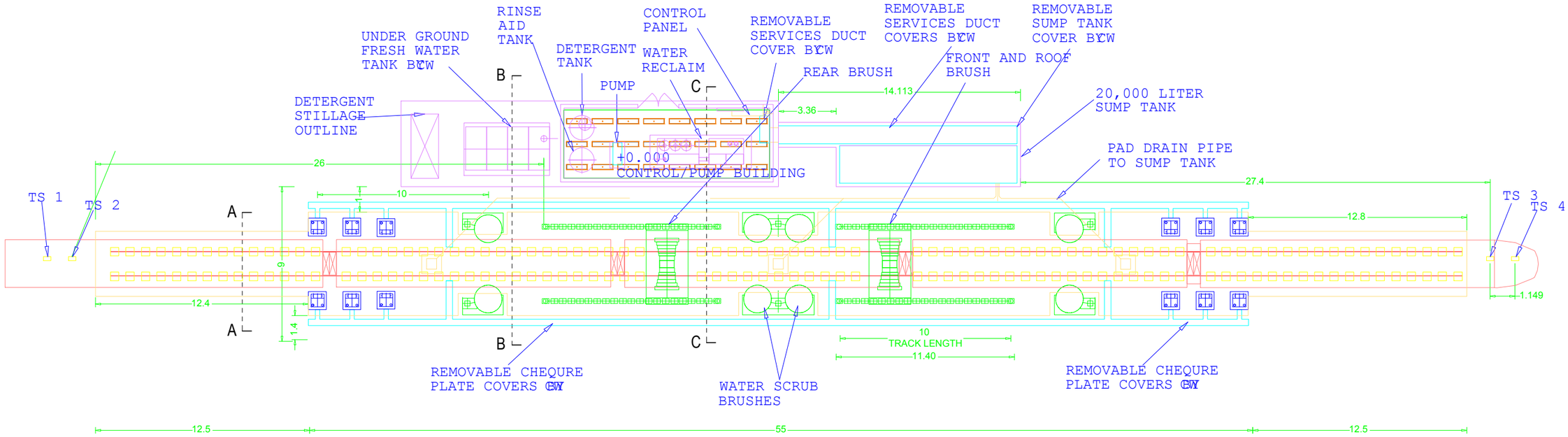
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: INFRA MAINTENANCE SHED - FIRST FLOOR
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1024

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

AUTO WASH PLANT CONTROL/PUMP BUILDING



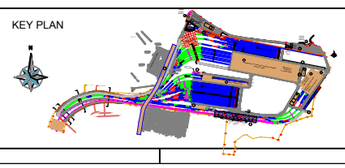
Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	28 W LED LUMINAIRE - SURFACE	24	672

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
CONTROL & PUMP BUILDING	Lux	300	358	240	0.80

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

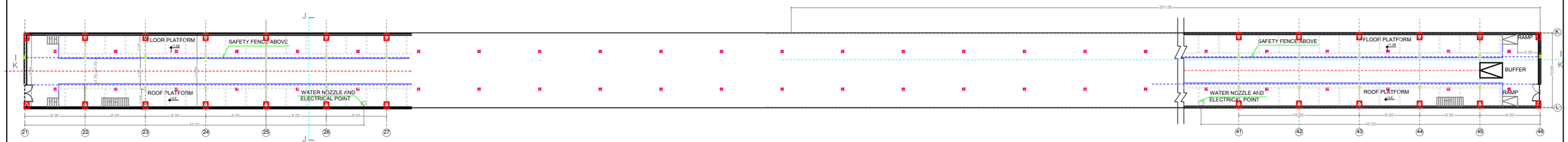
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: AUTOWASH PLANT
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1025

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

HEAVY WASHING SHED



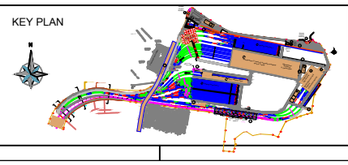
Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
▪	200 W LED HIGHBAY	50	10000

Calculation Summary						
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**	**Meter Type**
HEAVY WASHING SHED	Lux	300	356	198	0.66	Normal

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



E&M

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DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

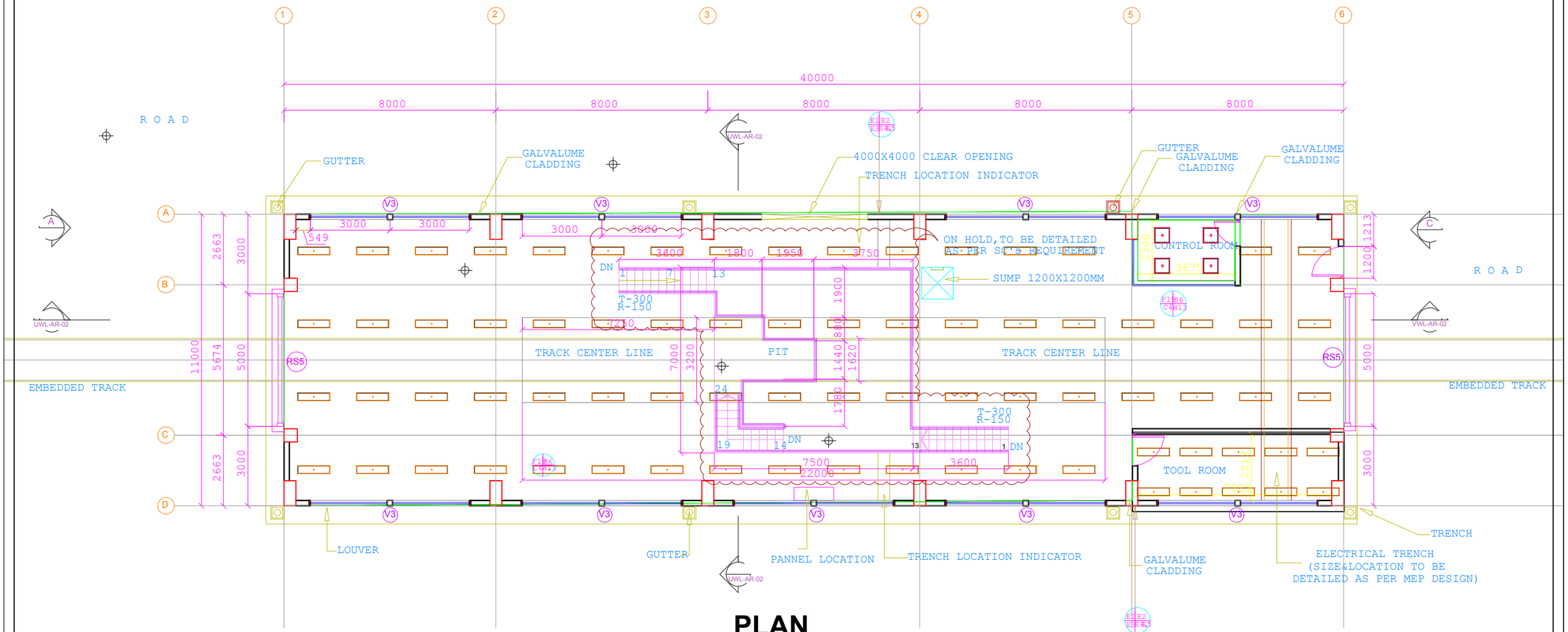
02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: HEAVY WASHING SHED
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1026

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

UNDER FLOOR WHEEL LATHE

ATTACHMENT NO. 5 TO ADDENDUM 1



PLAN

Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	28 W LED LUMINAIRE - SURFACE	76	2128
	2 x 2 LED - Surface Mounted	4	136

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
CONTROL ROOM	Lux	300	277	238	0.79
TOOL ROOM	Lux	300	305	215	0.71
UNDER FLOOR WHEEL LATHE	Lux	300	293	149	0.49

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN

E&M

FOR INFORMATION ONLY

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DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

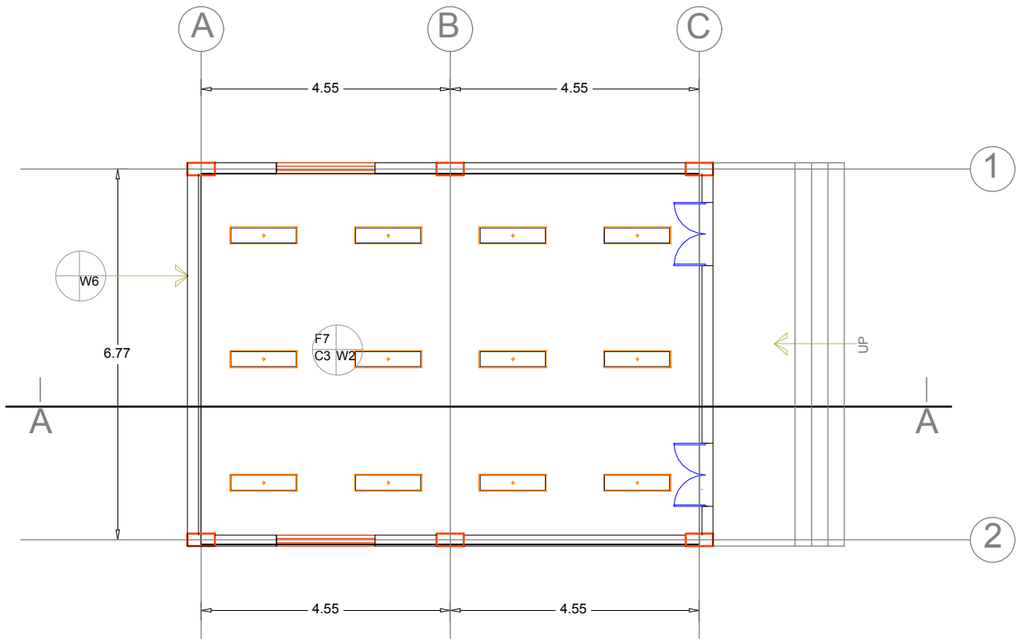
02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: UNDER FLOOR WHEEL LATHE
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1027

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

ATTACHMENT NO. 5 TO ADDENDUM 1

TRACTION SWITCHING STATION



GROUND FLOOR PLAN

Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
TRACTION SWITCHING STATION	Lux	250	325	191	0.76

Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	28 W LED LUMINAIRE - SURFACE	12	336

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN

E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: TYPICAL DRAWING

DRAWING TITLE: TRACTION SWITCHING STATION

SCALE: NTS

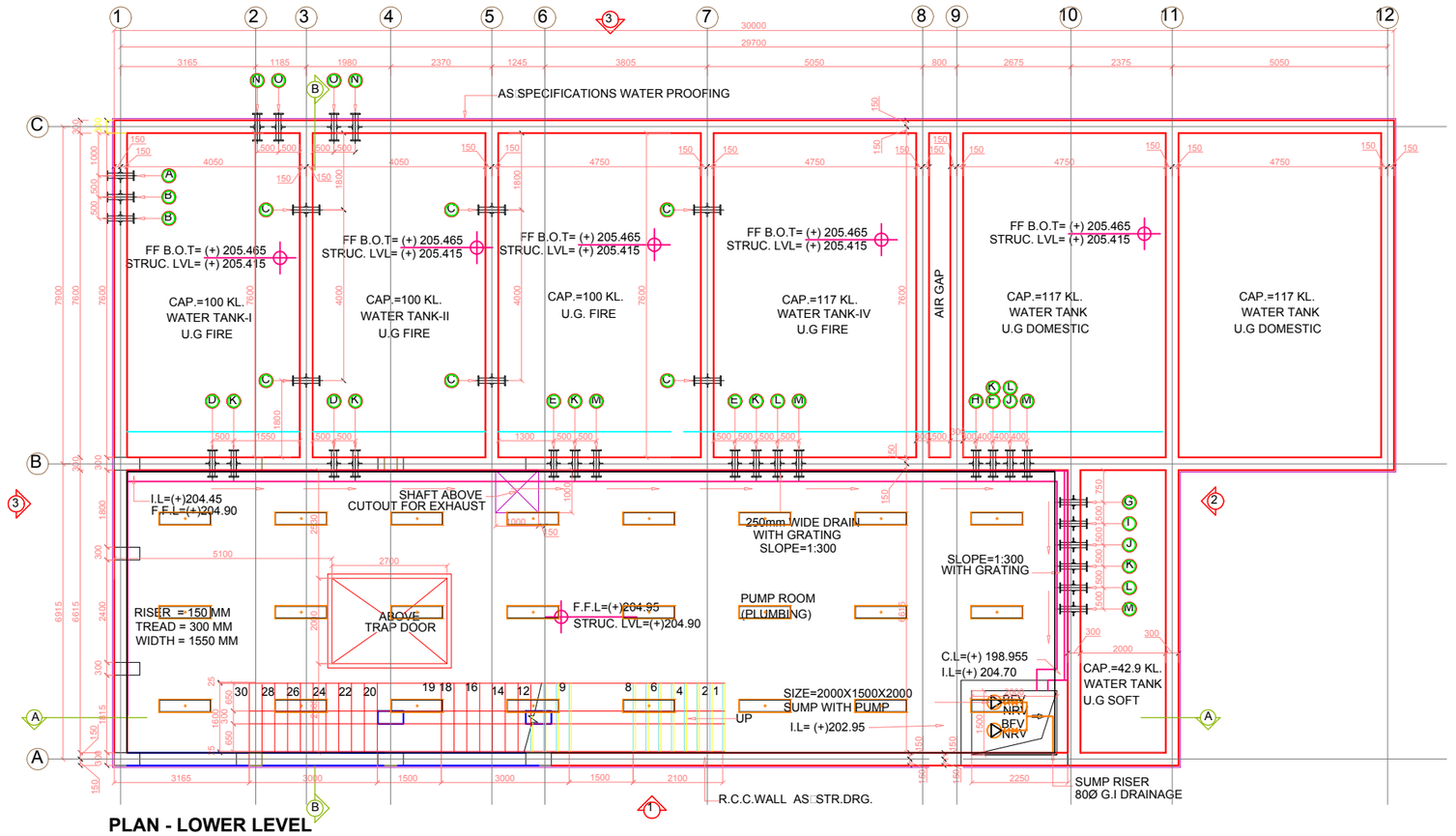
DRAWING NO: MM3-GC-DEL-GD-08-D09-1028

maple MUMBAI METRO LINE-3 GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

U.G.TANK BUILDING



PLAN - LOWER LEVEL

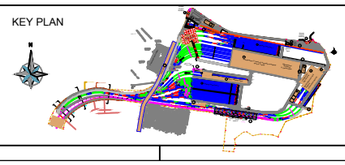
Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	28 W LED LUMINAIRE - SURFACE	24	672

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
PUMP ROOM	Lux	253.10	306	151	0.60

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: TYPICAL DRAWING

DRAWING TITLE: U.G. TANK BUILDING

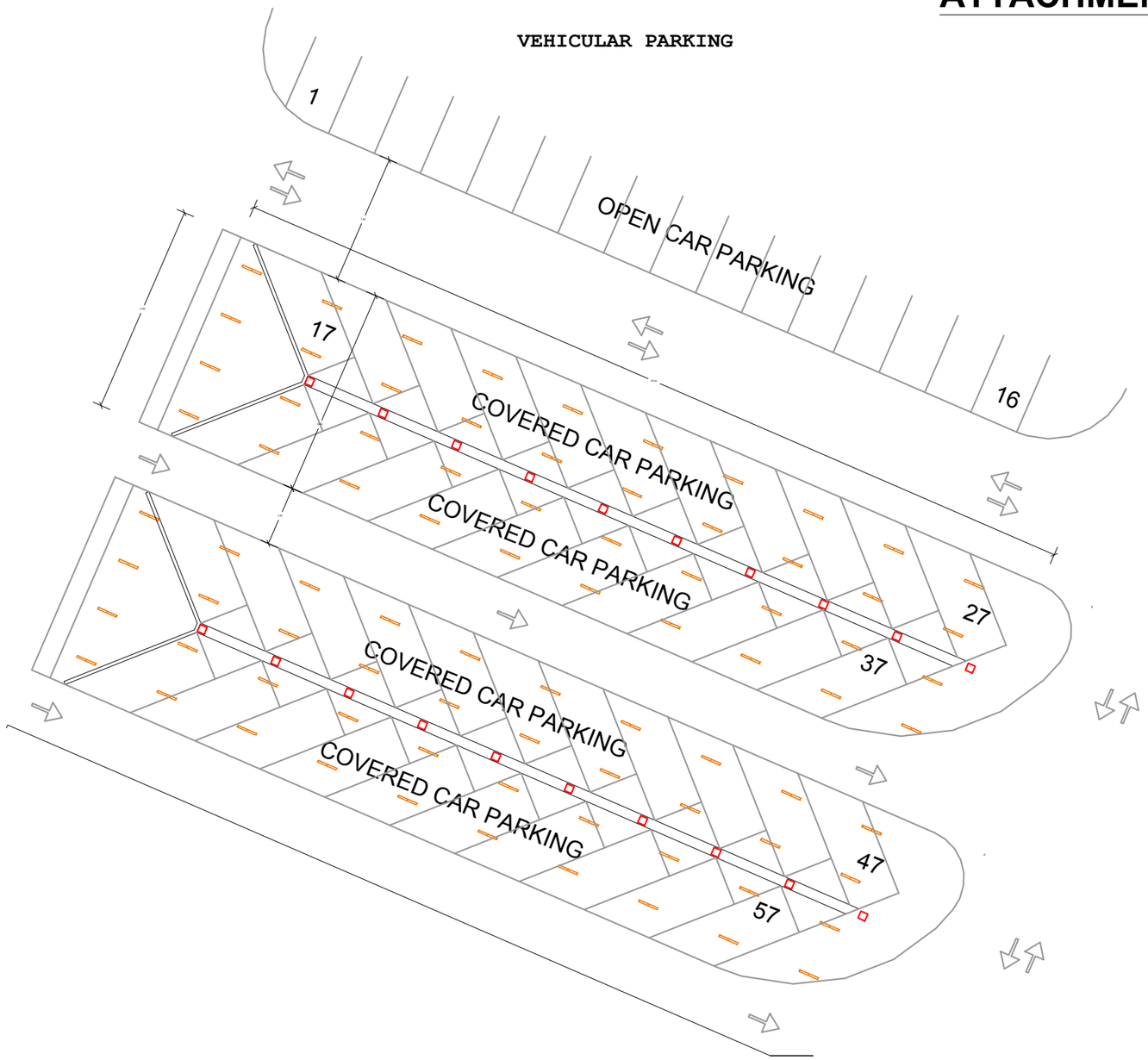
SCALE: NTS

DRAWING NO: MM3-GC-DEL-GD-08-D09-1029

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1



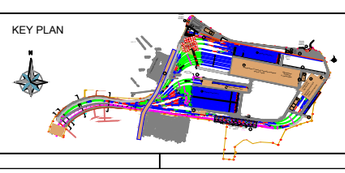
Luminaire Schedule			
Symbol	Label	Qty	Total Watts
-	28 W LED TUBE FIXTURE	80	2240

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
COVERED CAR PARKING	Lux	150	370	58	0.38

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ

DATE: SEP-2017

TITLE: TYPICAL DRAWING

DRAWING TITLE: VEHICULAR PARKING

SCALE: NTS

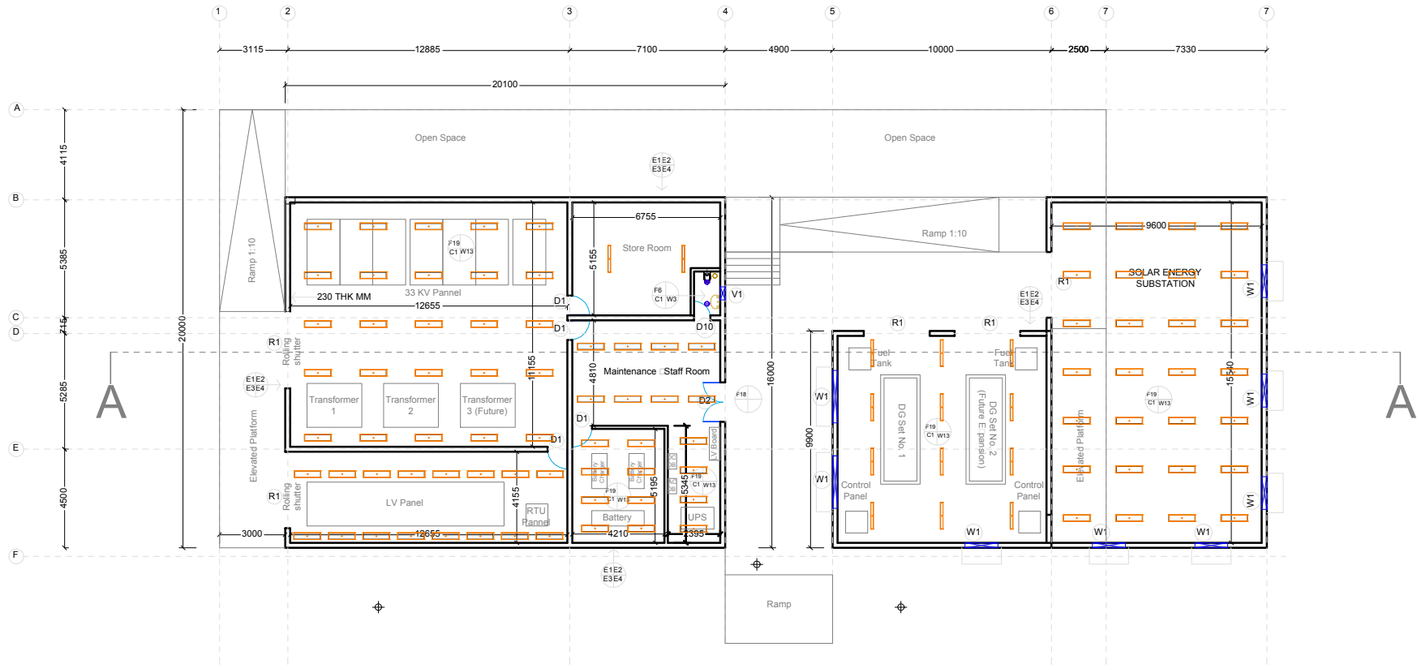
DRAWING NO: MM3-GC-DEL-GD-08-D09-1030

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

AUXILIARY SUB STATION 1



Ground Level Flooring Plan

Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	LED Downlighter	2	32
	28 W LED LUMINAIRE - SURFACE	89	2492
	28 W LED TUBE FIXTURE	14	392

Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
BATTERY ROOM	Lux	282.55	320	249	0.88
DG ROOM	Lux	272.85	358	175	0.64
LV PANEL ROOM	Lux	305.94	366	213	0.70
MAINTENACE_STAFF ROOM	Lux	231.34	304	144	0.62
PANEL ROOM	Lux	271.14	334	169	0.62
SOLAR ENERGY SS ROOM	Lux	286.16	349	192	0.67
STORE	Lux	105.73	142	69	0.65
TOILET	Lux	121.00	123	119	0.98

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN

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FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: AUXILIARY SUB-STATION
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1031

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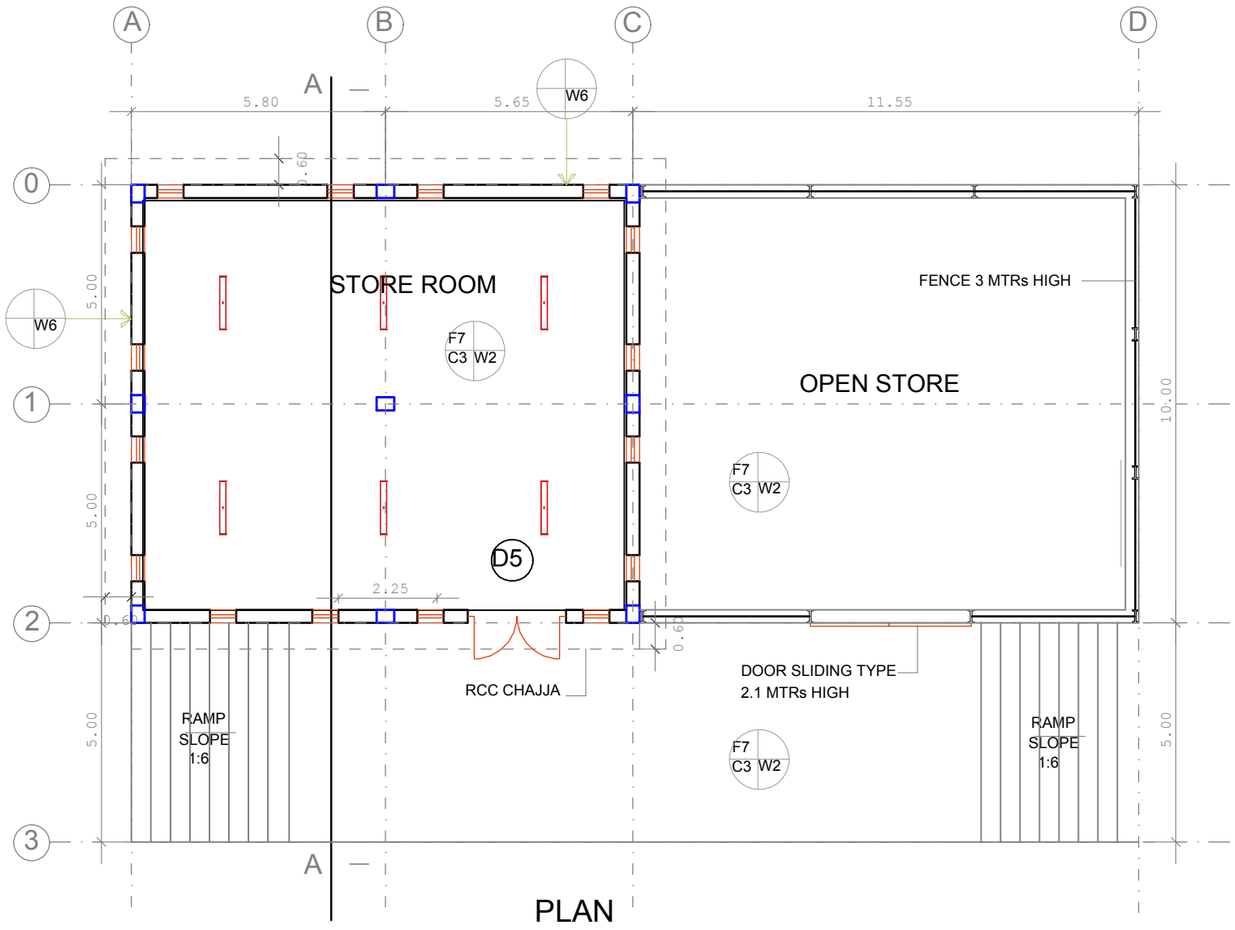
ATTACHMENT NO. 5 TO ADDENDUM 1

HAZARDUS STORE



PLAN

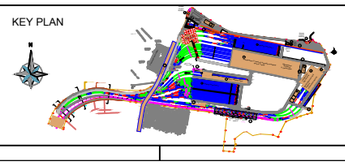
Calculation Summary					
Label	**Units**	**Avg**	**Max**	**Min**	**Min/Avg**
STORE ROOM	Lux	150	185	81	0.54

Luminaire Schedule			
Symbol	**Label**	**Qty**	**Total Watts**
	FLAMEPROOF 28 W LED TUBE FIXTURE	6	168

REV.	DATE	PREP.	APPROVED	DESCRIPTION

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

KEY PLAN



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FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

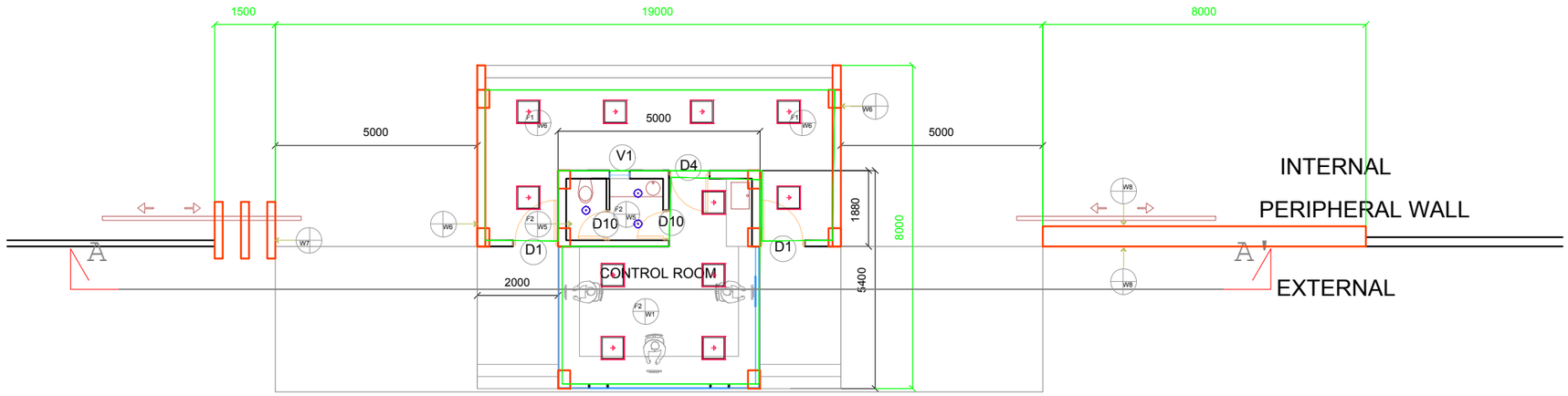
PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: HAZARDOUS STORE
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1032

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

ATTACHMENT NO. 5 TO ADDENDUM 1

ACCESS CONTROL 1 & 2



GROUND FLOOR PLAN

Luminaire Schedule			
Symbol	Label	Qty	Total Watts
	2 x 2 LED - Surface Mounted	11	374
	LED Downlighter	3	48

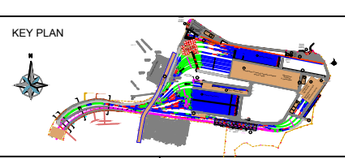
Calculation Summary					
Label	Units	Avg	Max	Min	Min/Avg
CONTROL ROOM_Workplane	Lux	315.95	376	253	0.80
IN & OUT AREA_Floor	Lux	218.46	270	145	0.66

REV.	DATE	PREP.	APPROVED	DESCRIPTION

MMRC

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

KEY PLAN



E&M

FOR INFORMATION ONLY

	NAME	SIGN
DRAWN BY		
DESIGN BY		
CHECKED BY		
APPROVED BY		

02-SEP-2017

PROJECT: MUMBAI METRO LINE 3 COLABA-BANDRA-SEEPZ
DATE: SEP-2017
TITLE: TYPICAL DRAWING
DRAWING TITLE: ACCESS CONTROL 1 & 2
SCALE: NTS
DRAWING NO: MM3-GC-DEL-GD-08-D09-1033

maple
MUMBAI METRO LINE-3
GENERAL CONSULTANT

F E D C B A

MUMBAI METRO LINE 3
(COLABA-BANDRA-SEEPZ)

CONTRACT NO: MM 3-CBS-DEM

Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

VOLUME 6 OF 6

PREAMBLE

&
BILL OF QUANTITY (BOQ)

SEPTEMBER - 2017

Mumbai Metro Rail Corporation Ltd.
Plot No. R-13, 'E' Block,
Namttri Building
Bandra - Kurla Complex,
Bandra (East), Mumbai – 400051, India

Composition of Documents

Volume 1	**Bidding Procedure**
Section I	Notice Inviting Tender (NIT)
Section II	Instructions To Tenderer
Section III	Form of Tenders
Volume 2	**Conditions of Contract and Contract Forms**
Section IV	General Conditions of Contract (GCC)
Section V	Special Conditions of Contract (SCC)
Volume 3	**Employer's Requirement- General Specification**
Volume 4	**Employer's Requirement – Technical Specifications**
Section VI – A	Electrical - HT
Section VI – B	Electrical - LT
Section VI – C	Ventilation & Air Conditioning (VAC)
Section VI – D	Fire Alarm and Detection System (FADS)
Section VI – E	Fire Suppression (Fire Fighting System)
Section VI – F	Building Management System (BMS)
Section VI – G	EOT Cranes (Electric Over Head Travelling Crane)
Section VI – H	Air Compressor (Compressed Air System)
Section VI – I	Plumbing Pumps (Drinking, Treated and Sewer)
Volume 5	**Tender Drawings**
Section VII – A	Electrical - HT
Section VII – B	Electrical - LT
Section VII– C	Ventilation & Air Conditioning (VAC)
Section VII – D	Fire Alarm and Detection System (FADS)
Section VII – E	Fire Suppression (Fire Fighting System)
Section VII – F	Building Management System (BMS)
Section VII – G	EOT Cranes (Electric Over Head Travelling Crane)
Section VII– H	Air Compressor (Compressed Air System)
Section VII – I	Plumbing Pumps (Drinking, Treated and Sewer)
Section VII – J	Civil Tender Drawings (Architectural / Utility)
Volume 6	**Bill of Quantities**

1. PREAMBLE

1.1 General Requirements.

The Tenderer's attention is drawn to the General Conditions of Contract, Special Conditions of Contract, Employer's Requirements (Technical specifications) and Drawings, which are to be read in conjunction with the Bill of Quantities. This Preamble shall serve as a definitive guide to the measurement of quantities and payment.

The Tenderer under this tender's scope of work should quote the rates taking into account the works of *Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3" under this tender document for MM3-CBS-DEM Scope of Work.*

The scope of work under this contract shall include but not limited to Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works, Transformer, 33KV Cable, GIS Panel, all Electrical (HT-LT) work including DG sets, Ventilation and Air Conditioning System (VAC), Fire Alarm and Detection System, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT crane, Air-Compressor including compressed air piping works and Plumbing Pumps of Depot cum workshop building including OCC and at grade Aarey Station of Mumbai Metro Line -3 under the contract MM3-CBS-DEM comprising of but not limited to the details mentioned below:

- SITC of Transformer, 33KV Cable, GIS Panel, all the Electrical HT & LT works including battery and battery chargers with DCDB, ACDB works.
- Conduit wiring, supply & fixing of modular type sockets and switches including industrial socket outlets wherever required and as per drawings & BOQ.
- External lighting including its feeder pillar, cabling, poles all complete, High Mast (as applicable.
- Lighting fixture for internal areas (including verification of lux level achievable in various areas) and external areas.
- Fire detection and alarm system including conducting and wiring.
- Safety equipment.
- All panels & DBs including Main Distribution Panel, Essential Power Panel, AC Power Panel, Main workshop panel, and Pit wheel lathe Panel, Fire Pump Panel, Water Pump Panel, Lighting Distribution Boards etc.
- Various distribution boards / panels as required with automatic source transfer system etc.
- DC control supply system as required
- 1.1 kV grade power cables and control cables, cable trays, raceways and ducting.
- Exhaust fans, Air Circulator Fans, Ceiling fans, other Mechanical Ventilation Fans.

- Ventilation of basement & generator rooms, transformer rooms and substation & pump room, air-conditioning of equipment rooms/ office areas rooms. Precision Air Conditioning for System rooms.
- Protective (clean & main) earthing and lightning protection.
- Cabling, Hume pipes, cable termination, Pole foundations etc. for external lighting.
- Uninterrupted power supply system (UPS).
- Protection and interlocks.
- Gas flooding in system rooms, Fire pumps, fire hydrants, sprinklers and fire system piping in station building and PD area.
- CO2 gas based fire trace tube system in electrical panels and fire extinguishers.
- SITC of DG sets of various capacities including AMF panels, earthing and other accessories.
- SITC of EOT cranes and Compressors of various capacities in Depot.
- Interfacing with designated contractors / DDCs as per interface matrix and work requirement.
- Submission of Shop drawing / Study Reports etc. for the Erection, Installation , Testing and commissioning of all the systems
- Verification of Design by the DDC nominated / appointed under this contract for the various E&M systems to be installed, as submitted

Scope of work shall also include but not limited to the following works mentioned below

Scope of work shall also include all minor civil works associated with electrical system works as required.

- Obtaining the Fire clearance certificate from Fire authorities and other statutory approvals as applicable.
- Obtaining EIG (Electrical Inspector) clearance for energising of Electrical Systems as per statutory requirement.
- Maintenance of the area during implementation stage.
- De-mobilisation, clearing of all temporary works and facilities after completion of job.
- Any other item of work as may be required to be carried out for completing the work under this Contract in all respects in accordance with the provisions of the Contract and/or to ensure the safety of installation during and after execution.
- The contractor shall have a Detailed Design consultants (DDC) (For detailed Scope of Work Refer to Addendum-1, Attachment-2) approved by the employer under this contract.

1.2 Interfaces Work

The DEM contractor will be required to have a close interface with civil and system wide contractors as mentioned in Employer's Requirement Volume-3, but not limited to the depot and Aarey Station Civil contractor, STPT, Track, Rolling Stock, OCS & PSS, AFC, ECS & TVS (TVE), Lifts & Escalator. In addition the contractor shall have a close interface with their Detailed Design consultants (DDC) respectively.

The Contractor shall be required to carry out various miscellaneous works as per interfacing requirements.

The Scope of Work for various interfacing works for other Contractors mentioned above shall be but not limited to as described below:

- Cable ducts/cables/hangers/trays/Raceways for routing all type of cables.
- Earthing and lightning protection as required.

Supply of relevant documentation mainly including:

- Installation, execution, and as-built drawings,
- Test procedures,
- Maintenance & operation manuals

The contractor is required to submit soft copies of all the documents,

- On-site and off-site training sessions of MMRC staff.
- Maintenance during DLP.
- The work shall include all activities to make the units fully functional and to meet the requirements of power supply arrangement and other works complete as required.

1.3 Quantities

For the purpose of this Contract, all unit quantities given in the **Price Schedule** (Bills of Quantities) are the estimated quantities of the Works and are intended in the first instance to provide a common basis for Tendering and Tender Evaluation. When a contract has been entered into, the function of priced Bills of Quantities is to provide for the valuation of the work executed. No alteration of any rate or price shall be allowed on account of any difference between the quantities billed and the actual quantities measured from the drawings.

The Tenderer shall make himself completely acquainted with all conditions, obligations, specifications, drawings, etc. of the Tender Documents before giving his **percentage (above / at par / below).** He shall have no right to claim any price revision on the basis of ignorance of the Tender Documents or local conditions, or to make any claims as regards the integrity of the unit prices of the **Price Schedule.** (Bills of Quantities.)

1.4 Units and Currency.

All sizes and quantities entered in the **Price Schedule** (Bills of Quantities) are in metric units.
The Tenderer shall fill in **percentage (above / at par / below**, **Total contract Price is in Indian Rupees (INR).**

1.4.1 Tender Price and Sums to be for Work Complete.

Tenderers shall be deemed to have read the Employer's Requirements and other parts of the Tender Documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the **percentage (above / at par / below.** The entered **percentage (above / at par / below)** shall be deemed to include for the full scope of the Contract, including overheads and profits and shall bear a proper relationship to the cost of carrying out the work described.

Notwithstanding any limits that may be implied by the wording of the individual items and/or the explanations in the Preamble, the **percentage (above / at par / below)** which the Tenderer enters in the **Price Schedule** (Bill of Quantities), shall be for the work finished complete in every respect.

The Tenderer shall be deemed to have taken full account of all requirements, liabilities, obligations and risks, whether expressed or implied, and to have **assessed** the items accordingly. The Items in the **Price Schedule** (Bills of Quantities) are the only items against which payment will be made. The cost of any item of work not specifically described or measured in the **Price Schedule** (Bills of Quantities) but required for the execution of the Contract shall be included in the unit rates for the measured items in the **Price Schedule** (Bills of Quantities). The **percentage (above / at par / below).** shall therefore include for all incidental and contingent expenses and risks of every kind necessary to supply, install, test and commission (including Integrated Testing and Commissioning) complete, and remedying any defects in the whole of the Works in accordance with the Contract.

The tenderer is required to note clause – 24 of SCC & Clause 11.1.1 of GCC while quoting his **percentage (above / at par / below).** This tender is NON JICA funded.

The tenderer shall be solely responsible for obtaining the benefits that have considered in their tender and in case of failure to receive such benefits, the employer shall not compensate the tenderers. It will be the responsibility of the contractor to avail maximum benefits available to MMRC in terms of above provisions.

This tender is a DDC based **Percentage Rate** (BOQ) contract for the works mentioned in the scope of work in this document and as per the Employers Requirement's

All the prices shown in the schedules shall include all the taxes & duties including but not limited to GST (CGST, SGST, IGST, and UTGST), Custom Duties, royalties, levies, cess etc. which constitute the contract price and will be the total amount to be paid to the contractor for executing the works and performing all other obligations under this tender document.

The schedules and the contract prices shall not be subject to adjustment by the contractor in respect of any error or oversight in Volume 6 – **Price Schedule** (BOQ). Volume-6 represents the full extent of the contractor's entitlement to receive payment as per the Schedules, Arithmetical Errors, if any are found in the Contractor's submission, will be corrected by the Employer as indicated in the Instruction to Bidders.

The rate for each item detailed herewith in Volume-6 BOQ shall include but not limited to the preliminary and detailed design, supply of all the materials, equipment, cables, landing charges, shipping costs for transport by air, sea or land (or any combination thereof), insurance charges, taxes and duties including but not limited to GST (CGST,SGST,IGST,UTGST) , Custom Duties, royalties, levies, cess etc, unloading, storage, installation, factory testing, field testing and commissioning, supply of spare parts and special tools, training of employer's O&M staff, provision of as-built drawings, provision of O&M manuals, and all type of clearances / approvals required from government authorities. The rate also includes the contractor's profit and establishment overhead, all general risks, insurance liabilities, compliance with labour laws as per statutory obligations set out or implied in the tender, attending to defects list prepared by the Employer prior to handover of works and facilities, and any other

requirements to fulfil the tender and employer requirements stated within this tender scope of work for the period of completion of the scope of work including Defect Liability Period of 2years from the handover of the project by the nominated tenderer.

1.4.2 Allowances in total contract price

Full allowance shall be made in the **total contract price** and sums against the various items in the **Price Schedule** for all costs involved in performing the following except to the extent that work is specifically described and paid for in the **Price Schedule**. The list below is not exhaustive and the Tenderers are expected to take all costs involved while quoting the **percentage (above / at par / below)** that will not be subject to variation on any account.

a) all setting out and survey work;
b) temporary access roads and bridges, fencing, watching and security , lighting;
c) paying fees and giving notices to Authorities;
d) payment of all patent rights and royalties;
e) reinstatement of the Site;
f) safety precautions and all measures to prevent erosion and suppress fire and other hazards;
g) interference to the Works by persons, vehicles, and the like being legitimate users of the facilities on or in the vicinity of the Site;
h) the protection and safety of MMRC trains and services;
i) the protection and safety of Northern Railway trains and services on adjacent tracks;
j) supplying, maintaining and removing on completion, the Contractors own accommodation, offices, depots, stores, workshops, transport, welfare services and other facilities including telephones and facsimile machines and all charges in connection therewith;
k) the supply, inspection, testing, packaging and transportation of materials and of the Works as specified including the provision and use of equipment and arrangements for the Engineer's Inspectors and others;
l) maintaining public thoroughfares and footpaths, and maintaining access upon existing recognised routes;
m) providing, transporting to the Site, setting to work, operating (including all fuel and consumable stores), maintaining and removing from the Site upon completion all Construction Plant and Contractor's Equipment necessary for the execution of the Works and including the cost of all tests and other requirements in respect of such; plant and equipment;
n) working adjacent to or across existing services and installations;
o) complying with the requirements of the Employer in regard to Safety and Health, Quality Assurance, Environmental, and project implementation plans and making periodical submissions;
p) co-ordination and interference to the Works by the works of Designated Contractors and others employed by MMRC being legitimate users of the facilities on or in the vicinity of the Site;
q) remedying of defects and shrinkage, and works of amendment, reconstruction, replacement of other faults, fair wear and tear excepted, during Defects Liability Periods;

r) Protections to be implemented against Electromagnetic interference effects following line energisation
s) Insurance, including all risks in supply, erection, storage, transit, third party, Workmen's Compensation and others;
t) All tools, and equipment required for all tests prior and after delivery, and for testing and commissioning installed systems;
u) Carrying out all modifications to the given drawings, preparing construction detailed drawings and supplying originals, copies, and electronic files in accordance with employer's requirement.
v) Marine Insurance
w) All risk Insurance after arrival of goods in India
x) Custom clearance / Port Clearance
y) Handling at Port of arrival in India
z) Inland transportation from port of arrival to site of work
aa) Various bank guarantees/warranties/undertakings

1.4.3 Tender Pricing

Tenderers shall quote for the entire work on a "single responsibility" basis such that the total tender price covers all Contractor's obligations mentioned in or to be reasonably inferred from the Tender Documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation, completion of the whole of Works. This includes all requirements under the Contractor's responsibilities for testing and commissioning of the works including integrated testing and commissioning, the acquisition of all permits, approvals and tender licenses, etc.; the operation, maintenance and training services and such other items and services as are specified in the tender documents. The Tenderer shall take regard of the actual site conditions and the items entered in the various Statements.

Tenderers are required to quote the price for the commercial, contractual and technical obligations outlined in the tender documents. If a Tenderer wishes to make deviations or wants to put conditions, qualifications, etc., such deviations, conditions, qualifications etc. shall be listed **in Annexure-4 of ITT**. The Tenderer shall also provide in this statement the additional price, if any, for the unconditional withdrawal of the deviations, qualifications, conditions etc. This additional price for the unconditional withdrawal has to be given separately for each deviation, qualification, condition, etc. Any deviation/ qualification/ condition that is not priced for unconditional withdrawal shall not be considered.

The Tenderer shall price the Statements of Prices in Indian Rupees.

1.4.4 The Stage Payment shall be made refer Volume -3 Clause 2.2:

1.4.5 Important Notes related to the works are mentioned in table below:

1	Contractor will be responsible for providing a complete workable E&M, Fire Fighting and Fire Suppression system, VAC system, EOT crane & Air compressor system as per BOQ and detailed technical specifications enclosed, including necessary Interfacing with the other contractors (Civil works, S&T, DG, OHE and Rolling Stock etc.).
2	Contractor will be responsible for the verification of designs, preparation of Shop drawings, co-coordinating with various contractors for preparing and finalizing the co-ordinated services drawings.
3	Obtaining various statutory approvals viz. EIG (Electrical Inspector to Govt. of India) approval for various Electrical Installations for energizing the system, DFS clearance and No Objection Certificate for energizing Fire detection and Fire suppression systems.
4	The work includes providing training of not less than 60 trainer days to MMRC staff for various E&M Systems , Fire Fighting , Fire Alarm Annunciation system ,Air-conditioning system, EOT cranes & Air compressors system etc. along with training documents / soft copies of training manuals .
5	Contractor will maintain all the systems in a comprehensive manner including all kinds of spares and consumables without any extra cost during Defect Liability period of 2 years from the date of taking over and supply mandatory spares for a period of 2 years beyond DLP for EOT Cranes and Air Compressors. Scope of maintenance will include all consumable e.g. lamps, chokes, fuses, etc. and all preventive and breakdown maintenance spares and round the clock maintenance as per requirement.
6.	Vendors/ Product Make approval proposals shall be supported with the compliance of Specifications, Standards & BOQ by the manufacturer. The proposals shall be submitted with the G.T.P (Guaranteed Technical Parameter) of the product along with the Type test certificates (not more than 5 years old from the date of tender submission) of the various products, as per requirement.
7.	MMRC reserves the right for Inspection and Testing of Equipment's and Materials at Manufacturer's works in the presence of Contractor's and Manufacturer's representatives prior to dispatch of material. However, the contractor will be fully responsible for compliance of tender specifications and performance of equipment's/systems as per tender conditions.
8	The BOQ is formulated part wise. The contractor has to maintain separate record of the taxes & duties including but not limited to GST (CGST, SGST, IGST, UTGST), Custom Duties, royalties, levies, cess etc. for each part.
9	For payments made for items of BOQ against delivery of equipment to MMRC site, Indemnity Bond shall have to be submitted as per clause 46 of SCC.

1.5 Percentage Rate Tender Form (Envelop B1)

(Date and Reference)

To,
The Executive Director (Electrical)
Mumbai Metro Rail Corporation,
MMRDA Building, 5th Floor,
Bandra –Kurla Complex, Bandra (E)

Sub: CONTRACT NO: MM3-CBS-DEM for Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

Dear Sir\Madam,

With reference to your RFP dated --------- for above cited work, our **Offered Price** is as under-

(i) **For PART-A (Depot ASS- HT)**

……% above / at par/ below on price indicated in the Employer's Price Schedule. (a)

(ii) **PART-B (Aarey Depot Building) with ASS 2**

……% above / at par/ below on price indicated in the Employer's Price Schedule. (b)

(iii) **PART-C (OCC Building) with ASS 1**

……% above / at par/ below on price indicated in the Employer's Price Schedule. (c)

(iv) **PART-D (Aarey Station)**

……% above / at par/ below on price indicated in the Employer's Price Schedule. (d)

(The aforesaid % shall be applicable equally for each item of the subgroup indicated in price schedule).

(v) **Total contract price** (a + b + c + d) is Rs……..… (Rupees……) (e)

(vi) Total Offered price @ (e) above will be considered for evaluation for awarding the Contract and shall be inclusive of all the taxes & duties including but not limited to GST (CGST,SGST,IGST,UTGST) , Custom Duties, royalties, levies, cess etc.,

Yours Faithfully,

Authorized Signatory

2. Bill of Quantities. (BOQ): Detailed BOQ from page number 1 to 260

(Attachment No-6 to Addendum No-1)
Project Sum - Cost Estimate For - Aarey Station and Depot with OCC Building

Sub Head No.	ITEMS	Amount (Rs)
	PART-A (Depot Substation & HT)	
A.01	ELECTRICAL HT	55597954
	PART-B (Aarey Depot Building)	
B.01	ELECTRICAL LT (DEPOT)	156297838
B.02	FIRE DETECTION AND FIRE FIGHTING SYSTEM	36487332
B.03	EOT CRANE /COMPRESSOR	57666932
B.04	VAC SYSTEM	33107620
B.05	BUILDING MANAGEMENT SYSTEM	19510979
B.06	DEPOT PLUMBING PUMPS	2502935
	TOTAL	305573637
	PART-C (OCC Building)	
C.01	ELECTRICAL LT (OCC)	125607200
C.02	FIRE DETECTION AND FIRE FIGHTING SYSTEM	30887352
C.03	VAC SYSTEM	86042999
	TOTAL	242537551
	PART-D (Aarey Station)	
S.01	ELECTRICAL (STATION)	53852381
S.02	FIRE DETECTION AND FIRE FIGHTING SYSTEM	24033603
S.03	BUILDING MANAGEMENT SYSTEM	7597777
S.04	PLUMBING PUMP STATION	4574060
S.05	BASEMENT VENTILATION	2938710
	TOTAL	92996530
GRAND TOTAL FOR AAREY STATION, DEPOT AND OCC		696705672

(Attachment No-6 to Addendum No-1) Depot Sum - Cost Estimate For Aarey Station and Depot with OCC Building		
Sub Head No.	**ITEMS**	**Amount (INR)**
PART-A (Depot ASS- HT)		
A.01- ELECTRICAL HT SYSTEM		
A.01.1	GIS	29,466,464
A.01.2	Transformers	9,251,758
A.01.3	HT Cable	16,183,563
	Battery & Battery Charger	696,169
A.01		**55,597,954**
PART-B (Aarey Depot Building)		
B.01- ELECTRICAL LT SYSTEM		
B.01.1	MV Switchgear	43,135,100
B.01.2	Distribution Boards	1,724,818
B.01.3	Distribution Cable	31,656,814
B.01.4	CONDUIT WIRING	21,937,697
B.01.5	Indoor Lighting and Fans	20,759,037
B.01.6	Highmast & Street light pole	2,851,218

(Attachment No-6 to Addendum No-1) Depot Sum - Cost Estimate For Aarey Station and Depot with OCC Building		
Sub Head No.	**ITEMS**	**Amount (INR)**
B.01.7	Protective Earthing System	5,713,279
B.01.8	Lightning Protection	1,129,507
B.01.9	External Piping System	1,681,665
B.01.10	Compact Sandwich BusDuct	10,910,176
B.01.11	Uninterupted Power Supply system	4,814,875
B.01.12	DG Set	9,204,451
B.01.13	OHE On Off Indicator	779,202
B.01		**156,297,838**
B.02- FIRE DETECTION AND FIRE FIGHTING SYSTEM (DEPOT)		
B.02.1	Fire Detection and Alarm System	3,046,677
B.02.2	Fire Fighting System	24,407,311
B.02.3	Clean Agent Based Panel Flooding System for Electrical Panels	2,637,958
B.02.4	FM 200 Fire Suppression System	3,546,366
B.02.5	Fire Protective Clothing & Breathing Apparatus	334,075
B.02.6	TRANSFORMERS PROTECTION SYSTEM :	298,021
B.02.7	VESDA SYSTEM FOR SER,TER & UPS ROOM:	2,216,925
B.02		**36,487,332**

(Attachment No-6 to Addendum No-1) Depot Sum - Cost Estimate For Aarey Station and Depot with OCC Building		
Sub Head No.	**ITEMS**	**Amount (INR)**
B.03 -EOT CRANE/COMPRESSOR		
B.03.1	EOT CRANE	39,962,293
B.03.2	AIR COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING	17,704,638
B.03		**57,666,932**
B.04- VAC SYSTEM (AC SYSTEMS WITH VRV / VRF, SPLIT AC)		
B.04.1	AIRCONDITIONING	27,272,433
B.04.2	VENTILATION	3,538,277
B.04.3	AIR DISTRIBUTION	2,296,911
B.04		**33,107,620**
B.05- BUILDING MANAGEMENT SYSTEM(BMS)		
B.05.1	BMS- DEPOT	**19,510,979**
B.06- DEPOT PLUMBING PUMPS		
B.06.1	PLUMBING PUMPS DEPOT	**2,502,935**

(Attachment No-6 to Addendum No-1) Depot Sum - Cost Estimate For Aarey Station and Depot with OCC Building		
Sub Head No.	**ITEMS**	**Amount (INR)**
PART-C (OCC Building)		
C.01- ELECTRICAL LT SYSTEM		
C.01.1	MV Switchgear	41,080,377
C.01.2	Distribution Boards	1,012,189
C.01.3	Distribution Cable	28,205,026
C.01.4	CONDUIT WIRING	8,832,373
C.01.5	Indoor Lighting and Fans	9,222,272
C.01.6	Highmast & Street light pole	2,851,218
C.01.7	Protective Earthing System	4,332,587
C.01.8	Lightning Protection	236,607
C.01.9	External Piping System	1,307,591
C.01.10	Compact Sandwich BusDuct	10,910,176
C.01.11	Uninterupted Power Supply system	4,814,875
C.01.12	DG Set	12,801,909
C.01		**125,607,200**

(Attachment No-6 to Addendum No-1) Depot Sum - Cost Estimate For Aarey Station and Depot with OCC Building		
Sub Head No.	**ITEMS**	**Amount (INR)**
C.02- FIRE DETECTION AND FIRE SUPPRESSION SYSTEM (OCC)		
C.02.1	Fire Detection and Alarm System	2,190,182
C.02.2	Fire Fighting System	10,795,427
C.02.3	Clean Agent Based Panel Flooding System for Electrical Panels	1,754,047
C.02.4	FM 200 Fire Suppression System	14,482,469
C.02.5	TRANSFORMERS PROTECTION SYSTEM :	298,021
C.02.6	VESDA SYSTEM FOR UPS ROOM,CENTRAL EQUIPMENT ROOM & OCC THEATER:	1,367,207
C.02 (FIRE DETECTION AND FIRE SUPPRESSION SYSTEM)		**30,887,352**
C.03 - VAC SYSTEM WITH AIR COOLED CHILLER (OCC)		
C.03.1	AIR COOLED CHILLERS, PUMPS, AHU's & FCU's AND PRECISION	51,821,095
C.03.2	VENTILATION SYSTEM	7,728,206
C.03.3	CHILLED WATER//VALVES	9,456,193
C.03.4	AIR DISTRIBUTION SYSTEM	16,780,430
C.03.5	CHEMICAL DOSING	257,074
C.04		**86,042,999**

(Attachment No-6 to Addendum No-1) STN- SUM-- PART-D (Aarey Station)		
Sub Head No.	**ITEMS**	**Amount (INR)**
S.01 - ELECTRICAL SYSTEM FOR AAREY STATION		
E.01	MV Switchgear	14,569,084
E.02	Distribution Boards	1,618,830
E.03	MV Cabling	10,613,461
E.04	Conduit Wiring	4,866,853
E.05	Indoor Lighting and Fans	8,805,168
E.06	Protective Earthing	2,120,324
E.07	Lightning Protection	406,776
E.08	UPS System	5,617,354
E.09	D.G. Sets	5,234,531
S.01 - ELECTRICAL SYSTEM FOR AAREY STATION		**53,852,381**
S.02- FIRE DETECTION AND FIRE FIGHTING SYSTEM		
F.01	Fire Alarm System	1,624,975
F.02	Fire Hydrant System	3,174,284
F.03	Piping For Fire Fighting System	11,881,608
F.04	Sprinkler System	457,326
F.05	Portable Fire Extinguishers	249,777

(Attachment No-6 to Addendum No-1) STN- SUM-- PART-D (Aarey Station)		
Sub Head No.	**ITEMS**	**Amount (INR)**
F.06	Clean agent based panel flooding system for electrical panels.	2,282,438
F.07	FM 200 Fire Suppression System	2,881,752
F.08	Miscellaneous Fire Services Equipment	244,420
F.09	VESDA SYSTEM FOR SER,TER & UPS ROOM:	1,237,023
	S.02 - FIRE DETECTION AND FIRE FIGHTING SYSTEM	**24,033,603**
	S.03-BUILDING MANAGEMENT SYSTEM	
B.01	BUILDING MANAGEMENT SYSTEM	7,597,777
	S.03 - BMS FOR AAREY STATION	**7,597,777**
	S.04-PLUMBING PUMP STATION	
S.04	PLUMBING PUMP AAREY STATION	**4,574,060**
	S.05-BASEMENT VENTILATION	
S.05	Basement Ventilation for Aarey Station	**2,938,710**
	Grand Total	**92,996,530**

(Attachment No-6 to Addendum No-1) PART-A - Depot Substation & HT works					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
B1	**ELECTRICAL WORKS**				
	Sub Section - 1 - GENERAL				
1.1	The BOQ specified below include the latest relevant standards, specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer's representative may opt.				
1.2	The description as mentioned in BOQ, Specifications, Special Conditions GCC, Drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.				
1.3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.				
1.4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.				
1.5	Bus Bar Sizing calculations shall be submitted for approval of Employer or his representative.				
1.6	Contractor's shall quote reasonable rates against each item of BOQ (both in word and figure)				
2	**Sub Section - 2 - GIS.**				
2.1	In compliance to technical specifications the three way 33kv-GIS shall be installed inside auxiliary substations. The ring main units shall be installed on a super-elevated base to permit the entry of 33kV cable at the bottom. 33 kV GIS shall be SF6 insulated, extensible, indoor type with protective relays. (33kv/ 1250amps/ 25kA-1sec/ GIS panel).	**Set**	**4**	**7366616**	**29466464**
	Total of Sub section 2 - GIS				**29466464**
3	**Sub Section - 3 -Transformers**				
3.1	**Transformers (Indoor Dry type -33KV/433V)**				
	Supply, installation, testing & commissioning of indoor type following rating AN type Transformer with copper winding, and +5 to -5% in steps of 2.5%, 33/0.433 KV, 3 phase, 50 Hz, Vector Group Dyn-11 having cable end box on HV side and busbar arrangement on L.T. side with all fittings and accessories, Winding Temperature Indicator, weather proof marshalling box etc. complete as per specifications. The transformer shall be designed for minimum losses. Maximum permitted Total Losses (Percent of Transformer's ONAN rating) shall not be more than 1%.				

(Attachment No-6 to Addendum No-1) PART-A - Depot Substation & HT works					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Note:- All instruments / Relays / CT / terminals / Contact wiring to be done up to Marshalling box. Installation shall be done by the contractor in the presence of engineer deputed by the supplier.				
	2000 KVA Transformer	**No's**	**4**	**2312940**	**9251758**
	Total of Sub section-3 Transformers				**9251758**
	Sub Section - 4 -HT Cables				
4.1	Supply of 33 KV, 1C per phase x 120 Sq. mm XLPE Copper cable Earthed armoured HT cable in cable trenches with cover complete as required.	**Mtrs**	**7200**	**2000**	**14398560**
4.2	Laying of item under 4.1 in trench, duct banks, etc.as required.	**Metres**	**7200**	**200**	**1439856**
4.3	Supplying and making indoor cable end termination with heat shrinkable jointing kit complete with all accessories including lugs suitable for cables mentioned under 4.1 complete and combined as required. Cable termination shall be inner cone plug in type in accordance with EN 50181.	**Kit**	**30**	**11505**	**345147**
	Total of Sub section 4. HT Cables				**16183563**
	Sub Section-5 - DCDB with Battery Charger				
	1 set of 110V DC Battery and 2 Battery Charger consisting of Dual Float cum Boost Charger and Ni Cadmium battery (Minimum 120 AH) with backup time of 8 hours and DCDB (with 10 feeders minimum) as per “Technical Specification for 110V Battery, Battery Charger cum DCDB”,. The battery charger and battery will be located in ASS-1 & ASS-2 building.	Set	2	**348084**	**696169**
	Total of Sub section 5. HT Cables				**696169**
	Total of Sub Section 2, 3, 4 & 5.				**55597954**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.1	The BOQ specified below include the latest relevent standards (unless otherwise specified), specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer.				
1.2	The description as mentioned in this BOQ including details as metntioned in GCC, SCC, Employers Requirement General specifications & Technical specificatios , Drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.				
1.3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.				
1.4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.				
1.5	Bus Bar Sizing calculations shall be submitted for approval of Employer or his representative.				
1.6	Contractor's shall quote reasonable rates against each item of BOQ.				
1.7	Steel structure/pipe shall be earthed.				
E.01	**M V SWITCHGEAR**				
1	**General**				
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from CRCA sheet steel of thickness not less than 2mm in general and load bearing members with 2.5mm and shall be folded and braced as necessary to provide a rigid support for all components with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 65 kA for ASS - I & ASS - II at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.				
a)	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.				
b)	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. The busbars shall be insulated with heat shrinkable sleaves. SMC/DMC (Double Moulding Compound) shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.				
c)	The panel shall have Copper busbars (phases, neutral & earth) with bar type feeder connections, spacers etc.and phases & neutral busbar shall be of 100% capacity and Earthing Busbar shall be 50% of Phase.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
d)	DELETED				
e)	All accessories & supporting structures such as channels, ISMC base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.				
f)	Each incomer and outgoing feeder shall be provided with multiple LED/neon type status indication lamps suitable for 230 V AC as approved.				
g)	Overall Space provision shall be @ 25% for future expansion				
h)	The makes of components and accessories shall, to the extent practically feasible, be same for panels and boards for uniformity, standardisation and replaceability and shall be applicable to all panels/ boards under the scope of work				
i)	Switchboard including interconnections, labeling, earthing,associated foundation / masonary work & erection etc. complete as required.				
j)	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity (Ics suitable for isolation conforming to latest IEC60947-2 duly marked on MCCB, at operating voltage (Ue) of 415 V, insulation voltage (Ui) 750 V and with trip free mechanism, handle indicating ON/OFF/tripped position. The breaking capacity as mentioned shall be Ics values.				
k)	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution as required and with front adjustable overload and short circuit releases and minimum electrical endurance of the order of 7000-8000 operation cycles (higher shall be preferred) for capacity of 100-250 amps..				
l)	All the MCCBs shall be provided with potential free contacts for connectivity to PLC for ON/OFF status and control, as required.				
m)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type, lower power loss approx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.				
n)	Panel/board design shall be compact and components / accessories of compact sizes are used to economise the room space available. Employer reserve the right to seek compact items in place of larger ones				
o)	All incomer ACB's shall be provided with minimum 2 NO + 2 NC auxiliary contacts and all MCCBs shall be provided with 2 NO+ 2NC auxiliary contacts, and there should be provision to add min. 6 Auxiliary contacts.				
p)	All 4-pole ACBs shall have fully rated neutral pole. All 4-pole ACBs & MCCBs shall be provided earth fault protection.				
q)	The panel shall be fitted with fire trace tube system. Scheme of fire trace tube system shall be got approved by Engineer before proceeding with manufacturing and assembly.				
r)	All internal wiring to be FRLS				
s)	Various panels/boards as given below:				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	**MAIN DISTRIBUTION BOARD (MDB) @ ASS-2**	No	1	17268324	**17268324**
A.	**INCOMER - TRANSFORMER - 1**				
	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				
i.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				
B	**BUSBAR**				
a)	Electro-tin plated, hard drawn, high conductivity, 99% Copper bars three phase and neutral busbars rated at 3200 A having a maximum current density as as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 65 kA for 1 sec. at 415 V. The neutral busbar is to be of same size as phases. A ground bus, 50% size of phase bus, shall be provided along the entire length of the panel.				
C	**OUTGOING**				
a)	2 Nos. 1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
i	1- set Red/Green ON/OFF indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
ii	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
iii	TNC Switch.				
iv	Auto/local/remote selector switch key operated.				
b)	1 No. 1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
i	1- set Red/Green ON/OFF indicating lamps				
ii	3 nos. cast resin current transformers of 1000/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
iii	TNC Switch.				
iv	Auto/local/remote selector switch key operated.				
c)	3 nos. 630 Amps, , 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
d)	2 nos. 400 Amps, 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
e)	1 no. 100 Amps, 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
f)	4 no. 63 Amp, 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
D	**BUS COUPLER**				
a)	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage with adjustable setting with the following accessories :				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
i	1- set Red/Green ON/OFF indicating lamps				
ii	1- set of three phase (red, yellow, blue) indicating lamps				
iii	Amber /healthy trip indicating lamps				
iv	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
v.	TNC Switch.				
vi.	Auto/local/remote selector switch key operated.				
E.	**INTERLOCKING**				
	Two incomers & one Bus Coupler shall be interlocked electrically & mechanically so that only two out of three shall be switched on at a time.				
F.	**INCOMER - TRANSFORMER - 2**				
	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting and with the following accessories :				
i.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs.				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/trip indicating lamps.				
vii	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x.	Terminals to receive copper sandwich bus duct				
xi.	TNC Switch				
xii	Auto/local/remote selector switch key operated				
G	**BUSBAR**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Electrolytic high conductivity Copper three phase and neutral busbars rated at 3200 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 65 kA at 415 V. The neutral busbar is to be of same size as phases.				
H	**OUTGOING**				
a)	3 Nos. 1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
i	1- set Red/Green ON/OFF indicating lamps				
ii	3 nos. cast resin current transformers of 1000/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	TNC Switch				
iv	Auto/local/remote selector switch key operated				
b)	2 nos. 630 Amp, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
b)	3 nos. 400 Amp, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
c)	2 nos. 160 Amp,, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
d)	2 nos. 100 Amp, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
I	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
2	**EMERGENCY POWER PANEL(EPP) @ ASS-2**	No	1	8618036	**8618036**
A	**INCOMER - 1**				
	1 no. 630 Amps, 415V, Ics=50kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv	1- set Red/Green ON/OFF indicating lamps.				
v	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B.	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to withstand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.				
C.	**OUTGOING**				
a)	2 nos. 320 Amp, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 320/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos. 160 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	3 nos. 100 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
d)	1 no.63 Amp, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D.	**BUSCOUPLER**				
	1 no. 630 Amps, 415V, Ics=50kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
ii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iii.	1- set Red/Green ON/OFF indicating lamps.				
iv	1- set of three phase (red, yellow, blue) indicating lamps.				
v	Amber healthy/ trip indicating lamps.				
E.	**INTERLOCKING**				
a)	Three incomers & one Bus Coupler shall be interlocked electrically & mechanically so that only two out of three shall be switched on at a time and only one out of three in DG case.				
F.	**INCOMER - 2**				
	1 no. 630 Amps, 415V, Ics=50kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv	1- set Red/Green ON/OFF indicating lamps.				
v	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
G.	**INCOMER - 3 for DG Supply**				
	1 no. 630 Amps, 415V, Ics=50kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv	1- set Red/Green ON/OFF indicating lamps.				
v	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
H.	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to withstand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.				
I.	**OUTGOING**				
a)	2 nos. 160 Amp, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	5 nos. 63 Amp, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
J	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3	**Maintenance inspection & workshop Control store**				
3.1	**MDB-1 (Maintenance inspection & workshop Control store)**	No	1	4465863	**4465863**
A	**INCOMER**				
a)	1 Nos. 1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50KA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
i.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	1- set Red/Green ON/OFF indicating lamps				
iii.	3 nos. cast resin current transformers of 1600/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
iv.	TNC Switch				
v.	Auto/Local/Remote Selector Switch Key operated				
vi.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
vii.	1- set of three phase (red, yellow, blue) indicating lamps.				
viii	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1600 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	4 nos. 250 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 250/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	4 nos.160 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	1no. 125 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
d)	3nos. 100 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
e)	2 nos. 63 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3.2	**MDB-2 (Maintenance inspection & workshop Control store)**	No	1	727947	**727947**
A	**INCOMER**				
a)	1 Nos. 1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50KA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
i.	3 nos. cast resin current transformers of 1000/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	1- set Red/Green ON/OFF indicating lamps				
iii.	3 nos. cast resin current transformers of 1000/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
iv.	TNC Switch				
v.	Auto/Local/Remote Selector Switch Key operated				
vi.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
vii.	1- set of three phase (red, yellow, blue) indicating lamps.				
viii	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1000 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
C	**OUTGOING**				
a)	2 nos. 630 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	6 nos. 100 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	3 nos. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
d)	2 nos. 32 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3.3	**SDB-1 -POWER**	No	1	709110	**709110**
A	**INCOMER**				
	1 no. 630 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	3 nos. 125 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	7 nos. 63 Amps, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3.4	**SDB-2 - LIGHTING**	No	1	1262266	**1262266**
A	**INCOMER**				
	1 no. 250 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 250/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 250/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 250 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	15 nos. 32 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos. 40 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3.5	**EPP - (Maintenance inspection & workshop Control store)**	No	1	287925	**287925**
A	**INCOMER**				
	1 no. 320 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 320/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 320/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 320 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	2 nos. 100 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	1 no.80 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 80/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos.63 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	4 nos. 40 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
3.6	**ESDB - LIGHTING (Maintenance inspection & workshop Control store)**	No	1	626503	**626503**
A	**INCOMER**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 80 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 320/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 80/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 80 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	11 nos. 32 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
4	**UNDER FLOOR WHEEL LATHE BUILDING**				
4.1	**MDB (UNDER FLOOR WHEEL LATHE BUILDING)**	No	1	593787	**593787**
A	**INCOMER**				
	1 no. 400 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
ii.	3 nos. cast resin current transformers of 400/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	2 nos. 320 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 320/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos. 63 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	5 nos. 32 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
4.2	**EPP (UNDER FLOOR WHEEL LATHE BUILDING)**	No	1	258822	**258822**
A	**INCOMER**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 100 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 100/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 100 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	2 nos. 63 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos.40 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	2 nos.25 Amp, 415V, Ics=25kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
5	**INFRASTRUCTURE BUILDING**				
5.1	**MDB-1 (INFRASTRUCTURE BUILDING)**	No	1	307166	**307166**
A	**INCOMER**				
	1 no. 630 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	2 nos. 120 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 120/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	1 no. 80 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 80/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	3 nos. 63 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	8 nos. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
d)	8 nos. 32 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
e)	2 nos. 25 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
5.2	**MDB-2 (INFRASTRUCTURE BUILDING)**	No	1	307166	**307166**
A	**INCOMER**				
	1 no. 400 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 400/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi	Amber healthy/ trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	2 nos. 120 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 120/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	3 nos. 80 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 80/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	6 nos. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
d)	2 nos. 32 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
e)	2 nos. 25 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
5.2	**EPP (INFRASTRUCTURE BUILDING)**	No	1	268441	**268441**
A	**INCOMER**				
	1 no. 250 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 250/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
i.	3 nos. cast resin current transformers of 250/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
ii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iii.	1- set Red/Green ON/OFF indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
iv.	1- set of three phase (red, yellow, blue) indicating lamps.				
v.	Amber healthy /trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 250 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	3 nos. 40 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	9 nos.25 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
6	**AUTO WASH PLANT**				
6.1	**MDB (AUTO WASH PLANT)**	No	1	294719	**294719**
A	**INCOMER**				
	1 no. 160 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
i.	3 nos. cast resin current transformers of 160/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
ii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iii.	1- set Red/Green ON/OFF indicating lamps.				
iv.	1- set of three phase (red, yellow, blue) indicating lamps.				
v.	Amber healthy /trip indicating lamps.				
B	**BUSBAR**				
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 160 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	2 nos. 125 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos.32 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	2 nos.25 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
7	**FIRE PUMP PANEL - FPP**	No	1	1229216	**1229216**
A	**Incomer -1 - from ASS -1 LT Panel**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 400 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi.	Amber healthy/ trip indicating lamps.				
vii	Auto / Manual selector switch				
viii.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 5P10 for protection				
ix.	230 V AC shunt trip coil				
x	230 V, AC Motor wound spring closing mechanism				
xi	Terminals to receive **fire survival** cables.				
B	**Incomer - 2 - from ASS -2 LT Panel**				
	1 no. 400 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi.	Amber healthy /trip indicating lamps.				
vii	Auto / Manual selector switch				
viii.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 5P10 for protection				
ix.	230 V AC shunt trip coil				
x	230 V, AC Motor wound spring closing mechanism				
xi	Terminals to receive **fire survival** cables.				
C	**Incomer - 3 - from DG Panel**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 400 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-				
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
iv.	1- set Red/Green ON/OFF indicating lamps.				
v.	1- set of three phase (red, yellow, blue) indicating lamps.				
vi.	Amber healthy/ trip indicating lamps.				
vii.	Auto / Manual selector switch				
viii.	3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 5P10 for protection				
ix.	230 V AC shunt trip coil				
x	230 V, AC Motor wound spring closing mechanism				
xi	Terminals to receive **fire survival** cables.				
	Incomer shall have electrical and mechanical interlocking through base plate for fail safe operation to ensure that 2 MCCB's shall not be ON simultaneously.				
D	**BUSBAR**				
i	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.				
E	**OUTGOING**				
i	**Main Fire pump: 4 Set**				
	160A TP MCCB 35 KA with 60 kW fully automatic star/delta starter with over load protection, current sensing type single phase preventer complete with all accessories. and internal wiring required for automatic operation, and following points (One outgoing set shall be for each main Fire pump and for 4 main fire pumps, the outgoing shall have 4 identical sets).				
	1- set Trip, ON & Run indicating lamps.				
	Start, Stop push button				
	Auto / Manual selector switch				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
ii	**Jockey pump: 2 Set**				
	32A TP MCCB 35 KA with 5.0 kW fully automatic star/delta starter with over load protection, current sensing type single phase preventer complete with all accessories and internal wiring required for below points				
	1- set Trip, ON & Run indicating lamps.				
	Start, Stop push button				
	Auto / Manual selector switch				
	3 nos. cast resin current transformers of 32/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
	The panel shall be complete in all respects as per specification having incomer and outgoing for operating 4 nos main fire pumps and 2 no jockey pump and rate of all the items are included in this.				
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.				
F	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
8.0	**FEEDER PILLAR - EXTERNAL LIGHTING**				
8.1	**FEEDER PILLAR - EXTERNAL LIGHTING - HIGH MAST (OUTDOOR TYPE IP-65 AS PER SPECIFICATIONS)**	SET	1	278475	**278475**
A	**INCOMER**				
	1 no.63 A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases				
	1 Set of (0-500 volts) digital voltmeter with selector switch with MCB's, and one set of Digital Ammeter with 3 nos. 63/5 Amps, 15 VA, CT				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 Nos. 0-24 Hrs double dial timer				
	3 Nos. Auto / manual selector switch				
	6 Nos. 16 A TPN contactor with necessary NO& NC auxilliary contacts of 2 Sets.				
	1 Job control flexible cabling from contactor to Timer				
B	**BUSBAR**				
	63 amps TPN Copper bus bars with heat shrinkable insulation sleeve.				
C	**OUTGOING**				
	16 amps TP+N MCBs 6 Nos				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
8.2	**FEEDER PILLAR - EXTERNAL LIGHTING - STREET LIGHT (OUTDOOR TYPE IP-65 AS PER SPECIFICATIONS)**	SET	1	278475	**278475**
A	**INCOMER**				
	1 no.40 A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases				
	1 Set of (0-500 volts) digital voltmeter with selector switch with MCB's, and one set of Digital Ammeter with 3 nos. 40/5 Amps, 15 VA, CT				
	1 Nos. 0-24 Hrs double dial timer				
	3 Nos. Auto / manual selector switch				
	6 Nos. 10A TPN contactor with necessary NO& NC auxilliary contacts of Sets.				
	1 Job control flexible cabling from contactor to Timer				
B	**BUSBAR**				
	40 amps TPN Copper bus bars with heat shrinkable insulation sleeve.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
C	**OUTGOING**				
	10 amps TP+N MCBs 6 Nos				
D	**METERING**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.				
9.0	**APFC PANEL**				
9.1	**400 KVAR APFC PANEL @ ASS-2**	SET	2	332667	**665333**
A	**INCOMER**				
	1 No. 1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
	1- set Red/Green/Amber -ON/OFF/Alarm indicating lamps				
	1- set of three phase (red, yellow, blue) indicating lamps				
	1 Set of (0-500 volts) digital voltmeter with selector switch with MCB's, and one set of Digital Ammeter with 3 nos. 1000/5 Amps, 15 VA, CT				
	TNC Switch.				
	Auto/local/remote selector switch key operated.				
	1 set of suitable rating of Current Transformer for incomer in main panel for APFCR relay				
	1- set of three phase (red, yellow, blue) indicating lamps.				
	1 Set - Automatic microprocessor based digital type power factor compensating relay (including power factor meter) in 14 steps for automatic cut off or add on capacitor units to keep the power factor at 0.95 with variation of loads. All associated auxiliary contactors/relays to be provided. Visual alarms, to display shortfall of P.T., automatic lockout of faulty Step, over temperature protrections. Auto manual selection and indications.				
B	**BUSBAR**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1000 A having a maximum current density of 1.4 A per sq mm with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V.The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
	Outgoing feeders consisting of following accessories.				
	1 nos. 250 amps, 35kA TP MCCB with backup fuses of suitable capacity				
	4 nos. 160 amps, 35kA TP MCCB with backup fuses of suitable capacity				
	4 nos.80 amps, 35kA TP MCCB with backup fuses of suitable capacity				
	1 nos. 250 amps 415 volts 50Hz heavy duty contactors				
	4 nos.160 amps 415 volts 50Hz heavy duty contactors				
	4 nos. 80 amps 415 volts 50Hz heavy duty contactors				
	11 nos “ON” /”OFF” push buttons and indicating lamps				
	1 nos. 250 amps rating TP terminal blocks				
	4 nos. 160 amps rating TP terminal blocks				
	4 nos. 80 amps rating TP terminal blocks				
	1 nos. 100 KVAR capacitor units in bank form				
	4 nos. 50 KVAR capacitor units in bank form				
	4 nos. 25 KVAR capacitor units in bank form				
	The switchboard shall be complete with all interbconnections, risers, internal wiring, labels etc complete as required.				
10	**Other Accessories**				
10.1	**Safety equipments in Aux. Substation/MDB room**	Set	1	197732	**197732**
	Supply and fixing of the following safety equipments in Aux. Sub. Station /MDB room as per detailed descriptions given below and as per relevant IE rules & code of standard practice:-				
a)	High electro mat high voltage (11kV grade) mat of 6 MM thick and1000 mm wide and length on per LT panel requirement as per IS 15652-2006.				
b)	Laminated standard shock treatment charts in English & Hindi in ASS, DG room and Pump room.				
c)	Danger plate as per approved Style & sample written in English & Hindi for MV installations as required as per IE rules, IES and IS 2551 (latest) - 10 nos.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
d)	10 nos. First Aid Box Complete as approved by St. John ambulance or Indian Red Cross				
e)	Fire Buckets (Quantity will be in fire fighting BOQ)				
f)	Two Tool kit comprising 1 set of flat spanner (Taparia / Jalan), 1 set of box spanner, 1 no. Hacksaw frame with 10 No. blades, 1 no. large, medium, small screw drivers, 1 no. insulated plier, 1 no nose plier, 1 no. hand crimping tool upto 16 sqmm, 1 no. digital multimeter, 1 no. test lamp and 1 no. tester. Screw driver set for all types of screw heads also to be provided.				
11	**Adjustment Rate for Addition/Deletion**				
	Adjustment rates for addition/deletion of compartmentalised switchgear in above panels/boards of following rating including the supply, fabrication, extension, modification of the enclosure or in a separate enclosure, earthing, basbar, other sub-systems, accessories etc complete as required and as per specifications.				
11.1	**3200 Amps, 415 V, 65 kA, 4 Pole, ACB**	No	1	1141039	**1141039**
	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				
i.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				
11.2	**2000 Amps, 415 V, 65 kA, 4 Pole, ACB**	No	1	694466	**694466**
	2000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
i.	3 nos. cast resin current transformers of 2000/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 2000/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 2000/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				
11.3	**1600 Amps, 415 V, 65 kA, 4 Pole, ACB**	No	1	593268	**593268**
	1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				
i.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
11.4	**1250/1000 Amps, 415V, 65 kA, 4 Pole, ACB**	No	1	532582	**532582**
	1250/1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				
i.	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				
11.5	**1250/1000 Amps, 415V, 50 kA, 4 Pole, ACB**	No	1	519621	**519621**
	1250/1000 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 50 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories :				
i.	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current, Energy, Power Factor, KVAr, with communication port RS485 etc.				
ii.	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch				
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCBs				
iv	1- set Red/Green ON/OFF indicating lamps				
v	1- set of three phase (red, yellow, blue) indicating lamps				
vi	Amber healthy/ trip indicating lamps				
vii	3 nos. cast resin current transformers of 1250/1000/5 ratio with 15 VA Burden & Class 5P10 for protection.				
viii	230 V AC shunt trip coil				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
ix.	230 V, AC Motor wound spring closing mechanism				
x	Terminals to receive copper sandwich bus duct				
xi	TNC Switch				
xii	Auto/local/remote selector switch key operated				
11.6	630 A, 415V, Ics=65 kA, 4P, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	105218	**105218**
11.7	630 A, 415V, Ics=50 kA, 4P, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	98171	**98171**
11.8	400/320 Amps, 415V, **Ics=65 KA, 4P**, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	74919	**74919**
11.9	400/320 Amps, 415V, **Ics=50 KA, 4P**, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	64755	**64755**
11.10	250/200 Amps, 415V, Ics=50 kA, 4P, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	54000	**54000**
11.12	250/200 Amps, 415V, Ics=35 kA, 4P, MCCB with variable overcurrent and short circuit releases and 1-set of three phase indicating lamps (red, yellow, blue).	No	1	50398	**50398**
11.13	160/125 Amps, 415V, Ics=35 or 25 kA, TPN, MCCB with variable overcurrent and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps.	No	1	36969	**36969**
11.14	100/63 Amps, 415V,Ics=35 or 25 kA, FP, MCCB with variable overcurrent and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps.	No	1	37735	**37735**
11.15	100/63 Amps, 415V, ,Ics=35 or 25 kA, TPN, MCCB with variable overcurrent and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps.	No	1	32681	**32681**
11.16	Less than 63 Amps to 25 Amps, 415V, Ics=25 kA, TPN, MCCB with variable overcurrent and short circuit releases with heavy duty solid neutral link and 1-set of three phase indicating lamps.	No	1	25163	**25163**
11.17	5-32 Amps, 4P, MCB, 9/10 kA	No	1	9479	**9479**
11.18	40-63 Amps, 4P, MCB, 9/10 kA	No	1	10196	**10196**
11.19	5-32 Amps, TP, MCB 9/10 kA	No	1	9052	**9052**
11.20	40-63 Amps, TP, MCB, 9/10 kA	No	1	9725	**9725**
11.21	5-32 Amps, DP, MCB, 9/10 kA	No	1	8595	**8595**
11.22	40-63 Amps, DP, MCB, 9/10 kA	No	1	9109	**9109**
11.23	5-32 Amps, SP, MCB, 9/10 kA	No	1	8085	**8085**
11.24	40-63 Amps, SP, MCB, 9/10 kA	No	1	8415	**8415**
11.25	16-32 Amps, DP, RCCB, 30 mA	No	1	10858	**10858**
11.26	16-32 Amps, DP, RCBO, 30 mA	No	1	11608	**11608**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
11.27	16-32 Amps, TP, RCBO, 30 mA	No	1	13019	**13019**
11.28	Multiple LED/neon type indications	No	1	1139	**1139**
11.29	Timer (ASTRO)	No	1	5294	**5294**
11.30	Timer (Manual operated)	No	1	1428	**1428**
11.31	Ammeter/Voltmeter (3.5 digit display)	No	1	5711	**5711**
11.32	TP Contractors - 40/32 Amps	No	1	5717	**5717**
11.33	Aux. Contact 1 NO + 1NC for MCB	No	1	707	**707**
11.34	**32-63 Amps, TPN, MCCB (25/35 kA)**	No	1	27716	**27716**
	Supply, installation, testing and commissioning of 32-63 Amps, TPN, MCCB (25/35 kA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection with RYB indicating lamps at incoming with trip indications.				
11.35	**100 Amps, TPN, MCCB (25/35 kA)**	No	1	35596	**35596**
	Supply, installation, testing and commissioning of 100 A, TPN, MCCB (25/35 kA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection of suitable size with RYB indicating lamps at incoming with trip indications.				
11.36	**125/160 Amps, TPN, MCCB (35 kA)**	No	1	38727	**38727**
	Supply, installation, testing and commissioning of 125 A, TPN, MCCB (35 kA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection of suitable size with RYB indicating lamps at incoming with trip indications.				
11.37	**200 Amps, TPN, MCCB (35/50 KA)**	No	1	52749	**52749**
	Supply, installation, testing and commissioning of 200 A, TPN, MCCB (35/50 KA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection of suitable size with RYB indicating lamps at incoming with trip indications.				
11.38	**250 Amps, TPN, MCCB (35/50 KA)**	No	1	56051	**56051**
	Supply, installation, testing and commissioning of 250 A, TPN, MCCB (35/50 KA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection of suitable size with RYB indicating lamps at incoming with trip indications.				
11.39	**400 Amps, TPN, MCCB (50 KA)**	No	1	69212	**69212**
	Supply, installation, testing and commissioning of 400 A, TPN, MCCB (50 KA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection of suitable size with RYB indicating lamps at incoming with trip indications.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
11.40	**32 Amps, TPN, MCB (10 KA)**	No	1	9933	**9933**
	Supply installation, testing and commissioning of 32 A, TPN, MCB (10 KA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection complete as required.				
11.41	**63 Amps, TPN, MCB (10 KA)**	No	1	10686	**10686**
	Supply installation, testing and commissioning of 63 A, TPN, MCB (10 KA) in IP 56 rated surface/recessed GI box with the total unit having IP 56 ingress protection complete as required.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	TOTAL FOR E.01 (M V SWITCHGEAR)				**43135100**
E02	**DISTRIBUTION BOARDS**				
	General				
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3-phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bus bar assembly, phase segregating barriers, LED indicating lamps for incoming feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature range as per IS 694 FRLS PVC wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:				
a)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss approx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.				
b)	Residual current circuit breaker (RCCB) conforming to IS 12640 shall be provided with 30 mA sensitivity and electrically connected rated current capacity MCB for short circuit and over load protection as required				
c)	The LDBs may be required to accommodate Dimming Control equipment mountable on DIN rail. Contractor should refer to relevant specifications and drawings in this regard and submit his scheme for approval by Engineer in Charge.				
d)	All the contactors shall be provided with potential free contacts for remote monitoring and control.				
e)	Various distribution boards as given below:				
1	**Lighting distribution boards (LDB) Type-1**	No.	15	5648	**84725**
	1 no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 4 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
2	**Lighting distribution boards (LDB) Type-2**	No.	4	7330	**29322**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 4 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
3	**Lighting distribution boards (LDB) Type-3**	No.	3	16899	**50698**
	1 no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 6 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
4	**Lighting distribution boards (LDB) Type-4**	No.	7	18698	**130887**
	1no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 6 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
5	**Lighting distribution boards (LDB) Type-5**	No.	14	20973	**293628**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 8 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
6	**Lighting distribution boards (LDB) Type-6**	No.	2	23857	**47713**
	1no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 8 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
7	**Lighting distribution boards (LDB) Type-7**	No.	12	28709	**344512**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 12 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
8	**Power distribution boards (PDB) Type-8**	No.	3	23857	**71570**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 4 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
10	**Power distribution boards (PDB) Type-10**	No.	1	28709	**28709**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 6 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
11	**Power distribution boards (PDB) Type-11**	No.	2	23857	**47713**
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-32 amp DP 30 mA RCBO incoming and 8 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
12	**Power distribution boards (PDB) Type-12**	No.	3	28709	**86128**
	1 no. 40 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-40 amp DP 30 mA RCBO incoming and 8 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
13	**Power distribution boards (PDB) Type-13**	No.	7	24163	**169142**
	1 no. 63 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-63 amp DP 30 mA RCBO incoming and 8 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
14	**Power distribution boards (PDB) Type-14**	No.	3	23857	**71570**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 63 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-63 amp DP 30 mA RCBO incoming and 12 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
15	**Power distribution boards (PDB) Type-15**	No.	3	23857	**71570**
	1 no. 80 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 80 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-80 amp DP 30 mA RCBO incoming and 12 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings				
16	**VTPN Lighting distribution boards (LPDB) Type-15**	No.	1	24163	**24163**
	1 no. 100 Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 100 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 12nos 32A TP MCB with thermal magnetic protective releases out goings with neutral link				
17	**VTPN Lighting distribution boards (LPDB) Type-16**	No.	1	28709	**28709**
	1 no. 160Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 160 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 63A TP MCB-3Nos & 32A TP MCB-5 Nos with thermal magnetic protective releases out goings with neutral link				
18	**VTPN Lighting distribution boards (LPDB) Type-17**	No.	1	24163	**24163**
	1 no. 160Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 160 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 63A TP MCB-2Nos & 32A TP MCB-6 Nos with thermal magnetic protective releases out goings with neutral link				
19	**VTPN Lighting distribution boards (LPDB) Type-18**	No.	1	23857	**23857**
	1 no. 63Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 25A TP MCB-4Nos & 32A TP MCB - 4 Nos with thermal magnetic protective releases out goings with neutral link				
20	**VTPN Lighting distribution boards (LPDB) Type-19**	No.	2	23857	**47713**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 no. 40Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 4 nos 25A TP MCB with thermal magnetic protective releases out goings with neutral link				
21	**VTPN Power distribution boards (PDB) Type-21**	No.	2	24163	**48326**
	1 no. 120 Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 120 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 6nos 32A TP MCB and 2nos 63A TP MCB with thermal magnetic protective releases out goings with neutral link				
	TOTAL FOR E.02 (DISTRIBUTION BOARDS)				**1724818**
E.03	**DISTRIBUTION CABLES**				
	General				
	The Cable and Cable Containment System specified herein, must confirm to technical Specifications, in addition to the description given in respective items of BOQ , whether explicity specified or not. In case of contradiction between specifications and description in BOQ, the most stringent of the condition will apply				
	"All the items / parts mentioned in relevent clauses of the technical specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded."				
	The cable runs shall be measured upto the outer end of the boxes without any allowances for over lap in joints. The rate shall include all the above mentioned material, labour, etc. for laying as required.				
	It may be noted that the Contractor will be required to carry out cable sizing based on actual cable lengths, as per working Drawings developed by him and after incorporating any changes in load requirements from the tendering stage. Optimization must be carried out during cable sizing to reduce the cable requirement and size. Further, Contractor must obtain Engineer's approval on the Cable Sizing Calculation.				
1	**Cable Supply and Laying (FRLS)**				
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables on existing trays / walls/ columns/ indoor including the cost of supply and fixing, crimping lugs, double compression and weather proof brass glands, Earthing lugs and shrouds, supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.				
	Note 1: All cables 25 sqmm and above are AL conductors unless specified otherwise.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.1	4 core 400 sq mm AL conductor cable	M	1,964	1412	**2773327**
1.2	4 core 300 sq mm AL conductor cable	M	1,500	1109	**1663167**
1.3	4 core 240-sqmm AL conductor cable	M	650	1021	**663656**
1.4	4 core 185-sqmm AL conductor cable	M	435	742	**322834**
1.5	4 core 150-sqmm AL conductor cable	M	225	625	**140736**
1.6	4 core 120-sqmm AL conductor cable	M	789	578	**455821**
1.7	4 core 95 sq mm AL. Conductor cable	M	920	434	**399649**
1.8	4 core 70-sqmm AL conductor cable	M	1,045	368	**384289**
1.9	4 core 50 sq mm AL. Conductor cable	M	815	284	**231799**
1.10	4 core 35 sq mm AL Conductor cable	M	800	256	**204424**
1.11	4 core 25 sq mm AL Conductor cable	M	800	196	**156429**
1.12	4 core 16 sq mm CU Conductor cable	M	1,576	251	**395712**
1.13	4 core 10 sq mm CU Conductor cable	M	1,280	251	**321390**
1.14	4 core 6 sq mm CU conductor cable	M	7,342	327	**2398147**
1.15	4 core 4 sq mm CU conductor cable	M	700	244	**171094**
1.16	3 core 4 sq mm CU conductor cable	M	1,000	266	**265529**
1.17	3 core 6 sq mm CU conductor cable	M	400	266	**106212**
1.18	3 core 2.5 sq mm CU conductor cable	M	2,500	142	**355520**
2	**Cable Supply and Laying (Fire Survival)**				
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, **FIRE SURVIVAL CABLE, XLPE, Copper (CU)** conductor cables on existing trays / walls/columns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of supply and fixing, crimping lugs, double compression weather proof flame proof brass glands, Earthing lugs and shrouds, proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.				
	FIRE SURVIVAL cables are manufactured and tested in accordence with BS 7846, IS 7098 (Part-1), IEC 69331 and BS 6387 for required temperatures and duration based on the application and site conditions.				
iii	4 core 35 sq mm Cu. Conductor cable	M	200	781	**156200**
iv	4 core 10 sq mm CU Conductor cable	M	250	387	**96750**
v	4 core 6 sq mm CU conductor cable	M	100	276	**27600**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3	**Cable Trays & Racewayas**				
	"Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below."				
	Note: Trays shall be supported adequately at minimum 1 m distance from the building structure / ceiling by means of galvanized (as specified) MS structural members secured to the structure by dash fasteners or by grouting. This support should be capable of withstanding the weight equivalent of 3m length of the cables that can be laid in the trays. At turns the support has to be double and at both ends of the bend.				
3.1	**Cable Trays - For E&M, Systemwide contractors**				
3.1.1	900 mm wide x 50 mm deep cable tray	M	100	2501	**250086**
3.1.2	600 mm wide x 50 mm deep cable tray	M	2,000	1693	**3386328**
3.1.3	300 mm wide x 50 mm deep cable tray	M	2,500	1075	**2688620**
3.1.4	150 mm wide x 50mm deep cable tray	M	2,500	748	**1869258**
4	**Raceways in floor**				
	Supply, installation and testing of sheet steel raceways in floor, fabricated from 2.0 mm thick GI with minimum coating thickness 260 gm / sqm on both sides with removable cover plate complete with counter sunk cadmium plated brass screws, bends, tee-junctions, cross junction etc. rendered electrically continuous as approved and of following sizes. Necessary repair of floor shall be done after completion of work.				
4.1	200 mm wide & 50 mm deep Raceway	M	400	1437	**574609**
4.2	150 mm wide & 50 mm deep Raceway	M	400	1153	**461287**
5	**Ladder type cable trays**				
	Supply and fixing pre-galvanized factory fabricated GI ladder type cable trays, with radial bends, supports of the following sizes as per specifications.				
5.1	1000 mm wide Runners 25 x 100 x 25 x 3 mm Rungs 20 x 40 x 20 x 3 mm 250 mm Centre to Centre (C/C) Suspenders 50 x 50 x 5 mm angle 1500 mm Centre to Centre (C/C)	M	100	2453	**245309**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
5.2	750 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 50 x 50 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,250	1585	**1981746**
5.3	600 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	3,500	1432	**5012277**
5.4	450 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,500	1267	**1899810**
5.5	300 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,500		1597200
	TOTAL FOR E.03 (DISTRIBUTION CABLES)				**31656814**
E04	**CONDUIT WIRING**				
	General				
	Whether explicitly stated in the schedules below or not, the following must be complied with:-				
a	For supply and installation of conduits, flexible conduits and wiring, relevant clauses of Technical Specifications must be followed.				
b	"Wires supplied must conform to relevant clauses of Technical Specifications".				
c	Wiring accessories must conform Technical Specifications.				
d	In case of any contradiction between BOQ and Technical specifications, the most stringest condition of the two will apply.				
e	All final connections specially to vibrating equipments shall be made through steel flexible conduits.				
f	Recovery of conduit & fan boxes laid by Civil contractor will be made as per item no. 3 & 4.				
	"All the items / parts mentioned in relevant clauses of the Technical specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded."				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	**Light and Fan Wiring**				
	Supply, all materials, storing, handling, fixing, laying wiring and testing for light, fan, exhaust fan and 6A Socket points etc starting from the point control box to the point by using 2.5 sq.mm 1100 volts grade FRPVC stranded copper conductor in concealed GI Stove enamelled 16 gauge conduit including 2mm thick GI boxes, fan regulator boxes, together with wiring accessories such as 6A moulded flush mounted modular switches, sockets in boxes of suitable sizes including circuit wiring with 2 x 2.5 sqmm 1100 volts grade FR PVC insulated stranded copper conductor along with one run of 2.5 sq.mm PVC insulated (green colour) stranded earth wire complete with earthing of fixtures, sockets and boxes. PVC bushes for conduits ends, chrome-plated brass screws, identification ferrules at either ends complete in all respects as per standard specifications. (Lights, fans and 6 amps socket outlets may be wired on a common circuit and circuit shall not have more than ten points of light, fans and 6 amps sockets or a load of 800 watts whichever is less).				
1.1	**Primary Light Points**				
1.1.1	**Switch Control**	Nos	506		2012666
	"Point wiring for switch controlled primary light points with 3 x 2.5 sq mm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted flush mounted 240 volt 6 amp control switch of approved quality & colour housed in zinc chromate passivated GI boxes with moulded cover plate and including cost of circuit wiring (from DB to first switch in the sub circuit) complete as per specifications and as required."				
1.1.2	**MCB Control with 3 x 2.5 sq. mm wire**	Nos	138	7658	**1056821**
	Point wiring for DB/MCB controlled primary light points with 3 x 2.5 sq mm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications Including cost of circuit wiring (From DB to first light point) complete as per specifications & as required (cost of MCB not included)				
1.1.3	**MCB Control with 3 x 4 sq.mm wire**	Nos	267	11026	**2943826**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	"Point wiring for LED high/medium bay light fixtures MCB controlled primary light points with 3 x 4.0 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 32mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications Including cost of circuit wiring (From DB to first light point) complete as per specifications & as required (cost of MCB not included)."				
1.2	**Secondary Light Points**				
1.2.1	**Secondary Light Points with 3 x 2.5 sq. mm wires**	Nos	1,447	1097	**1586718**
	"Point wiring for Secondary light points with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications and as required."				
1.2.2	**Secondary light points with 3 x 4 sq. mm wires.**	Nos	643	2941	**1890945**
	Secondary light points for high/medium bay light fixtures with 3 x 4.0 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 32mm dia MS recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications and as required.				
1.30	**Point Wiring for Ceiling Fan Points**	Nos	76	2903	**220631**
	"Point wiring for ceiling fan points with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted flush mounted 240 volt 6 amp control switch and 240 volt 300 watt 5 Step electronic speed regulator of approved quality & colour housed in zinc chromate passivated GI boxes with moulded cover plate and with interconnections complete as per specifications and as required."				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.4	**Point wiring for air circulator fan**	Nos	97	2481	**240644**
	Point wiring for air circulator fan with 3 x 4 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted 240 volt 16 Amps, 3 pin combined shuttered socket outlets along with 240 volt 16 Amps, control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate with interconnections complete & supply & fixing of the fan electronic speed regulator as provided with air circulator fan complete as required. (Swiutch & Socket at diffrent location)				
1.5	**Wiring for Socket Outlets**				
1.5.1	**Point wiring for 6 amp socket outlets**	Nos	312	1654	**516135**
	Point wiring for 6 amp socket outlets with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc as required and including the cost of cutting/making good chases in brick work and including the cost of Supply and fixing modular grid plate mounted 240 volt 6 amp 5 pin combined shuttered socket outlets alongwith 240 volt 6 amp control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate and interconnections and including the cost of loop earthing with 2.5 sqmm FR PVC insulated 1100 volt grade stranded copper conductor wires complete as per specifications and as required.				
1.6.2	**Point wiring for 16 Amps, socket outlets (1 outlet wired on 1 circuit)**	Nos	372	9659	**3593161**
	"Point wiring for 16 Amps, socket outlets (1 outlet wired on 1 circuit) with 3 x 4 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted 240 volt 16 Amps, 3 pin combined shuttered socket outlets along with 240 volt 16 Amps, control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate with interconnections complete as per specifications and as required.				
1.6.6	**Point wiring for 3 phase 32 amp socket outlets**	Nos	19	23034	**437653**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	"Point wiring for 3 phase 32 amp socket outlets with 6 x 6.0 sqmm (3P+N+2E) FRLS PVC insulated 1100 volt grade flexible stranded (84 strands of 0.3 mm dia) copper conductor wires in IS embossed 50 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc. as required and including the cost of cutting/ making good chases in brick work and including the cost of Supply and fixing industrial type 32 amp 10 kA "C" 4P MCB and 415 volt 32 amp industrial metal clad socket outlet in 16 SWG powder coated GI box with interconnections and including the cost of 415 volts 32 amp 4P plug top complete as per specifications and as required."				
1.6.7	**Point wiring for 3 phase 63 amp socket outlets**	Nos	9	35221	**316988**
	"Point wiring for 3 phase 63 amp socket outlets with 6 x 10.0 sqmm (3P+N+2E) FRLS PVC insulated 1100 volt grade flexible stranded (140 strands of 0.3 mm dia) copper conductor wires in IS embossed 50 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc. as required and including the cost of cutting/ making good chases in brick work and including the cost of Supply and fixing industrial type 63 amp 10 kA "C" 4P MCB and 415 volt 63 amp industrial metal clad socket outlet in 16 SWG powder coated GI box with interconnections and including the cost of 415 volts 63 amp 4P plug top complete as per specifications and as required. "				
1.6.8	**Point wiring for weather proof 16 Amps, outlets**	Nos	93	14059	**1307449**
	Point wiring for weather proof 16 Amps, outlets with 3 x 4 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (84 strands of 0.3 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc. as required and including the cost of cutting/making good chases in brick work and including the cost of providing and fixing 2 pole 16 Amps, switch with 16 Amps, 240 volts socket outlet and plug top mounted and including a IP 56 rated surface/recessed box with the total unit having IP 56 ingress protection complete as required.				
1.6.9	**Point wiring for weatherproof 3 phase 32 amp socket outlets**	Nos	10	30154	**301537**
	Point wiring for weatherproof 3 phase 32 amp socket outlets with 6 x 6.0 sqmm (3P+N+2E) FRLS PVC insulated 660/1100 volt grade flexible stranded (84 strands of 0.3 mm dia) copper conductor wires in IS embossed 50 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc. as require and including the cost of cutting/ making good chases in brick work and including the cost of Supply and fixing 4 pole 32 amp switch with 32 amp 240 volts socket outlet and plug top mounted and including a IP 56 rated surface/recessed box with the total unit having IP 56 ingress protection complete as required.				
2	**Modular Grid Plat Mounted Switch/es and Socket/s**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply & installation of following modular grid plate mounted switch/ (es) and socket/(s) etc. on a suitable size mild steel electrogalvanised switch boxes complete in single or combination on prorate basis complete with the connections, earthing and testing as per specifications and as required: (Note the grid plate and MS BOX shall be selected suitably as per the requirement to fix the switches and sockets.				
2.1	6/10A modular switches.	Nos	10	327	**3266**
2.2	6 Amp Universal socket with 6 amp modular switch.	Nos	10	490	**4900**
2.3	6/16 Amps, Universal socket with 16 Amps, modular switch.	Nos	10	575	**5755**
2.4	**20/25/32 Amps, 1-Phase Industrial Socket Outlet**	Nos	102	6792	**692737**
	20/25/32A 1-Phase industrial socket outlet with 20/25/32A SP MCB in a GI enclosure with IP56 protection rating with all mounting & fixing accessories & terminations with separately lockable facility complete as required.				
2.5	**20/25/32 Amps, 3-Phase Industrial Socket Outlet**	Nos	156	9512	**1483932**
	20/25/32 Amps, 3-Phase industrial socket outlet with 20/25/32 Amps, TP MCB in a GI enclosure with IP 56 protection rating with all mounting & fixing accessories, terminations & Cable glands for cable entry with separately lockable facility complete as required.				
2.6	**40/63 Amps, 3- Phase Industrial Socket Outlet**	Nos	76	24009	**1824662**
	40/63 3-Phase industrial socket outlet with 40/63A TP MCB in a GI enclosure with all mounting & fixing accessories , terminations & Cable glands for cable entry with separately lockable facility complete as required.				
2.6	**125 Amps, 3- Phase Industrial Socket Outlet**	Nos	20	34957	**699130**
	125 3-Phase industrial socket outlet with 125A TP MCB in a GI enclosure with all mounting & fixing accessories , terminations & Cable glands for cable entry with separately lockable facility complete as required.				
3	**GI Conduiting**				
	Supply and installation of GI conduiting complete with GI junction and pull boxes, GI fish wires as specified and as shown below.				
	Note: Conduiting has been assumed for Telephone/Data Points through out the Depot. Requirement shall be confirmed by S & T Contractor.				
3.1	25 mm inner dia 1.6 mm thick	M	4,000	171	**684376**
3.2	32 mm inner dia 1.6 mm thick	M	100	239	**23887**
3.3	50 mm inner dia 2.0 mm thick	M	100	422	**42218**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4	Providing and fixing circular/ Hexagonal cast iron or M.S. sheet box for ceiling fan clamp, of internal dia 140 mm, 73 mm height, top lid of 1.5 mm thick M.S. sheet with its top surface hacked for proper bonding, top lidshall be screwed into the cast iron/ M.S. sheet box by means of 3.3 mm dia round headed screws, one lock at the corners. Clamp shall be made of 12 mm dia M.S. bar bent to shape as per standard drawing.	each	300	159	**47662**
	TOTAL FOR E.04 (CONDUIT WIRING)				**21937697**
E05	**INDOOR LIGHTING AND FANS**				
	General				
	"The Lighting System specified herein, must conform to the technical Specifications, in addition to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between specifications and description in BOQ, the most stringent of the condition will prevail."				
	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:-				
A)	**Luminaire minimum specifications and requirements**				
a.	Luminaires should operate at +/- 10% voltage fluctuation for continuous use to comply to IEC.				
b.	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of low smoke and zero halogen type. All luminaires shall be manufactured to relevant sections of IEC60598 or other approved international standards and the type tests for all luminaries shall be provided.				
c.	All internal wiring within the lighting fixtures shall be heat-resisting cables.				
1	**Indoor Light Fixture**				
1.1	Supply, installation, testing and commissioning of 34W LED luminaire (similar to Philips model- Full Glow - RC380B G2 LED35S-6500 PSD OD WH or approved eqivalent) with mid flux LED using efficient optics enclosed in a metallic CRCA powder coated housing with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	639	6408	**4094870**
b)	installation, testing, commissioning of above given items	Nos	639	341	**217948**
1.2	Supply, installation, testing and commissioning of 16W (Philips model Cirrus Mini - SM518C LED16S 6500 PSU OD GR - 16W or approved equivalent) recess mounted Down type light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	423	4741	**2005289**
b)	installation, testing, commissioning of above given items	Nos	423	249	**105457**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.3	Supply, installation, testing and commissioning of (Philips model Line Light - SP310X LED 222 - 6500 PSU OD GR or approved equivalent) 28W, surface mounted type light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	823	2991	**2461713**
b)	installation, testing, commissioning of above given items	Nos	823	164	**135324**
1.4	Supply, installation, testing and commissioning of 28W (Philips model Cirrus Mini - SM518C LED16S 6500 PSU OD GR or approved equivalent) surface mounted LED tube type light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	626	4095	**2563561**
b)	installation, testing, commissioning of above given items	Nos	626	216	**134924**
1.5	Supply, Installation, Testing & commissioning of (Philips model BY400V LED50S CW SK PSU S2 FG WH or approved equivalent) 50W High bay LED light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	513	6966	**3573543**
b)	installation, testing, commissioning of above given items	Nos	513	367	**188081**
1.6	Supply, Installation, Testing & commissioning of (Philips model Green Bay Gen II - BY400V LED180S CW SK PSU S2 FG WH or approved equivalent) 200W High bay LED light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	446	3473	**1548952**
b)	installation, testing, commissioning of above given items	Nos	446	183	**81758**
1.7	Supply, Installation, Testing & commissioning of 1X28W FLAME PROOF LED Light fixture with accessories as per specifications & drawings				
a)	Supply of above given items	Nos	6	2991	**17947**
b)	installation, testing, commissioning of above given items	Nos	6	164	**987**
1.8	Supply, Installation, Testing & commissioning of (Philips model- Tempo LED - BVP410 LED 242 CW HF NB FG S3 XT or approved equivalent) 250W LED Flood light fixtures with accessories as per specifications & drawings for yard lighting for Highmast fittings				
a)	Supply of above given items	Nos	36	3473	**125027**
b)	installation, testing, commissioning of above given items	Nos	36	184	**6639**
1.9	Supply, Installation, Testing & commissioning of (Philips model - GreenLine - BRP409 LED CW 034 MR PCC S1 PSU GR or approved equivalent) 40W LED light fixtures with accessories as per specifications & drawings for street lighting				
a)	Supply of above given items	Nos	72	6966	**501550**
b)	installation, testing, commissioning of above given items	Nos	72	367	**26397**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.10	Supply, Installation, Testing & commissioning of LED (Philips model - BVP410 LED 242 CW HF NB FG S3 XT or approved eqivalent) 100W LED Flood light fixtures with accessories as per specifications & drawings for Stabling yard lighting				
a)	**Supply of above given items**	Nos	515	3473	**1788588**
b)	**installation, testing, commissioning of above given items**	Nos	515	184	**94979**
2	**Fans**				
	Supply, installation, testing & commissioning of the following fans including fixing arrangement and with all accessories like down rods, 5 step electronic fan regulators, cover plates, cups as required for the following complete with necessary seamless pipe required for hanging of the fans etc.				
2.1	**Ceiling Fan 1200 mm Sweep**	Nos	195	1688	**329084**
	Ceiling Fan 1200 mm sweep with out regulator but with all accessories as per IS: 374, 1979 with all amendments as applicable as required.				
2.2	**Air Circulator Fans 600 mm Sweep**	Nos	97	7798	**756417**
	wall / column mounted industrial type heavy duty fan 600 mm dia sweep complete with all accessories required.				
	TOTAL FOR E.05 (INDOOR LIGHTING AND FANS)				**20759037**
E06	**HIGHMAST & STREET LIGHT POLES**				
	Highmast	Nos	3	532768	**1598303**
	Supply, installation, testing and commissioning of 30 m high mast system with its accessories. Mast shaft shall be of Bajaj / Philips / Keselec / Thorn, hot dip galvanised and suitable for wind velocity as per IS 875. It shall also include accessories for high mast including head frame, steel wire rope, trailing cable, double drum winch, Galvanised Lantern carriage arrangement suitable for 12 luminaires & its control gear boxes and lightning arrestor. The mast shall have an External powertool installed inside the base compartment for its operation and including following				
	Foundation bolts manufactured from special steel along with nuts, washers, anchor plates and templates.				
	S.I.T.C. of suitable neon Aviation lights as required.				
	Control panel housing with suitable TPN MCB incomer, one numbers single dial timer contactor circuit for the automatic control of luminaries.				
	Common power tool for the operation of the mast with single phase single speed motor along with reversing gear, stand, control push button and other accessories.				
	Earth Station of Pipe earthing (2Nos) as per IS:3043-1987 & IEEE:80-2000, including duplicate earth connection to the mast with 25x3 mm size GI Strip.				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Street Light Poles	Nos	72	17402	**1252915**
	9.0 meter hot dipped galvanised Octagonal with single & Double overhang arm & with foundation bolts, base plate complete with foundation, entry and exit pipes, control JB with connector generally as shown on drawings and as per specifications.				
	TOTAL FOR E.06 (Highmast & Street light pole)				**2851218**
E.07	**PROTECTIVE EARTHING SYSTEM**				
	General				
	Contractor has to check the value of soil resistivity before execution and contractor shall subject to submit detail earth mat calculations for approval to Engineer. After their final approval work shall subject to commenced.				
	Note:- Steel structure/pipe shall be Earth by suitable rating of earth strip/wire.				
1	**EARTHMAT**				
	Eartmat mat for ASS equipments HT Panel, Transformer neutal & body , LT Panel etc.,				
1.1	**50X6mm copper flat for Earth Mat @ ASS -2 Building**	M	750	615	**461621**
	Design,Supply, laying, testing and commissioning of 50X6mm copper flat for earth mat (at 700 mm to 3000 mm deep as per approved drawing & calculations) as per specifications including lap (of not less than 150 mm) & cross weld joints and providing bitumin coat at every joint as required. Earthing risers from earth mat to be brought out as per approved drawings and specifications wherever required.				
1.2	**30 mm dia Copper Rod for Vertical Electrodes**	Nos	15	2052	**30780**
	Design, Supply, laying, testing and commissioning of 30 mm dia copper rod, laying of vertical earth electrodes 3 m deep from earth mat including weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats.				
1.3	**Extra for Bituminous Coating and Hessian Tape Wrap**	M	400	36	**14221**
	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried earthing strips risers mentioned above in item 1.1 as per specifications and drawings as required.				
2	**MAINTENANCE FREE EARTHING**				
2.1	**Maintetance free earthing-**	Nos	70	6119	**428357**
	Design, Supply, installation and testing of copper bonded (25mmX 3Mtr)electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3	**EARTHING STRIPS & CABLES**				
3.1	**Strips for Interconnecting the Earthing Stations, Panels, DBs etc**				
	Supply, Laying, fixing, testing and commissioning of following strips for interconnecting the earthing stations, panels, DBs, Cable trays, etc. of the following sizes in built up trenches/ surface/ wall/ ground complete with holes & fixing, jointing/terminating accessories as per specifications as required. (Quantity shall be paid as per the actual measurement as executed) however direct measurement shall not exceed the quantity indicated in drawing approved by engineer.				
3.1.1	90 mm x 10 mm GI strip	M	200	863	**172649**
3.1.2	70 mm x 10 mm GI strip	M	2,500	639	**1597063**
3.1.3	65 mm x 8 mm GI strip	M	1,000	406	**405515**
3.1.4	50 mm x 10 mm GI strip	M	1,000	500	**499950**
3.1.5	50 mm x 6 mm GI strip	M	2,000	276	**551056**
3.1.6	25 mm X 6 mm GI strip	M	2,500	147	**366630**
3.1.7	50 mm x 6 mm Cu strip	M	1,500	615	**923241**
3.1.8	8 SWG Cu WIRE	M	3,000	46	**136653**
3.1.9	70Sqmm single core Copper cable for clean earthing	M	500	251	**125543**
	Note-1: In case of non availability of any of the sizes mentioned above, next higher size available in market shall be provided at the same rate.				
	Note-2: No additional payment will be made for providing Main Earth Terminals (made out of GI strips from within the above sizes). The METs will be required to be fixed on walls as required and will be provided with 12/16/20mm holes for connections of individual equipments earthing including the other system wide contractors.				
	TOTAL FOR E.07 (PROTECTIVE EARTHING SYSTEM)				**5713279**
E.08	**LIGHTNING PROTECTION**				
1	**Lightning Conductor Finials**	Nos	10	1085	**10854**
	Supply and fixing Lightning Conductor Finials made of 25 mm dia 1mtr long copper tube having a single prong at the top with 85 mm dia 6 mm thick copper base plate, fixing accessories and clamping with down conductor as per specifications complete as required.				
2	**Stainless Steel horizontal & Vertical Conductor**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, laying and fixing of the stainless stell horizontal & vertical conductor of following sizes on surface/wall/parapet/shaft complete with joints, bimetallic connectors, testing links & other fixing accessories and clamping/ connection with earth terminations as per specifications & drawing as required.				
2.1	25 x 3 mm thick SS Strip	M	50	94	**4722**
2.2	32 x 6 mm thick SS Strip	M	100	181	**18109**
2.3	25 x 6 mm thick SS Strip	M	5,500	149	**818807**
3	**Testing Joints**	M	40	854	**34174**
	Supply and fixing of the testing joints made of 25 mm x 6 mm thick Stainless stell strip 125 mm long with 4 Nos. SS bolts, nuts, check nuts and spring washers complete as required.				
4	**Maintetance free earthing-**	Nos	30	6732	**201946**
	Supply, installation and testing of copper bonded (25mmX 3Mtr) electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover				
5	**Air Craft Warning Lights**	Nos	4	10223	**40894**
	Supply, installation, testing & commissioning of air craft warning lights complete with non flickering type lights similar to GEC model ZH 752 or WIPRO model no. WAN 20001 or equivalent including lamps, mounting bracket, earthing, painting complete with accessories to automatically switch off lights. (Point wiring shall be done under subhead conduit wiring).				
	TOTAL FOR E.08 (LIGHTNING PROTECTION)				**1129507**
E.09	**EXTERNAL PIPING SYSYTEM**				
4	**PIPES**				
4.1	**HDPE Pipe**				
	Supply and laying of following HDPE pipe NP4 grade under paved areas/track crossings including necessary excavation, honching and back filling complete as required as per IS:14333:1996 with all amendments applicable.				
4.1.1	200 mm dia HDPE Pipe	M	100	1064	**106434**
4.1.2	120 mm dia HDPE Pipe	M	1,000	534	**534391**
4.1.3	80 mm dia HDPE Pipe	M	600	334	**200647**

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4.2	**Heavy/Medium Grade GI Pipes**				
	Supply and installation of following heavy duty grade GI pipes for cables crossing the rail tracks with all bendings complete as required including necessary excavation, honching and back filling as complete as required as per IS:3589 & IS 1239 with all amendments applicable,				
4.2.1	150 mm dia GI pipe	M	50	1980	**98990**
4.2.2	100 mm dia GI pipe	M	100	1349	**134875**
4.2.3	80 mm dia GI pipe	M	100	991	**99101**
4.2.4	40 mm dia GI pipe	M	50	546	**27275**
4.3	**RCC Hume Pipes**				
	Supply and installation of following RCC Hume pipes NP4 grade, for cables crossing the roads with all fitting accessories complete as required including necessary excavation, honching and back filling as compete as required as per IS:458: 2003 with all amendments applicable.				
4.3.1	450mm dia RCC Pipe	M	50	2629	**131431**
4.3.2	250mm dia RCC Pipe	M	100	802	**80214**
4.3.3	150mm dia RCC Pipe	M	500	537	**268307**
	TOTAL FOR E.09 (EXTERNAL PIPING SYSYTEM)				**1681665**
E.10	**COMPACT SANDWICH TYPE BUS DUCT**				
1	**3200 amps Compact Sandwich Bus Duct**	M	30	363673	**10910176**
	Supply installation, testing & commissioning of the following totally enclosed, dust and vermin proof Low impedance compact sandwich bus duct:				
	Ingress protection IP 55				
	Indoor mounts				
	14 SWG sheet steel clad				
	Electrolytic Grade Cupper(Cu.) bus bar				
	Operation at 415 Volt 3 phase 50 Hz system				
	Insulation voltage 1000 volts				
	Fault withstand 65 kA symmetrical for 1 second				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	The bus duct shall be complete with all required accessories like clamps, end covers, thrust pads, flexible connections end termination flange joint etc. as required and including wall mounting brackets and including the cost of expansion joints complete as per specifications, as required and as below and suitable for operation at 415 volt 3 phase 50 Hz system.				
	3200 amps 3P +100%N+50% Integral Earth including bends.				
	TOTAL FOR E.10 (COMPACT SANDWICH TYPE BUS DUCT)				**10910176**
E.11	**UNINTERRUPTED POWER SUPPLY SYSTEM**				
	Supply, Installation, Testing and Commissioning of **following rating online, UPS** system suitable for providing power supply to emergency lighting and Computerised Control panel load of approved make, suitable for incoming 415 volts, 3 phase +10 % - 20%, 50 Hz, supply and three phase output voltage, variation ± 1%, including transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annunciation,protection(including against input phase reversal), and menu run diagnostic module,associated cabling and connections/ terminations, erection including associated foundation/ masonorey or RCC work for mounting on base channels etc. complete as per specifications and as required.				
	The UPS shall be a true parallel redundant with bypass with Individual Battery Bank on each UPS for 2 Hours (2X100% Redundancy on Battery Setup)				
11.1	2 X 60KVA UPS (PR System)	No	1	1292867	**1292867**
11.2	Supply, Installation, Testing and Commissioning of 2V SMF VRLA lead acid sealed maintenance free battery (Design Life - 10years) suitable for 2 hours backup to the UPS set. Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material. (60KVA UPS)	Set	1	3522008	**3522008**
	TOTAL FOR E.11 (UNINTERRUPTED POWER SUPPLY SYSTEM)				**4814875**
E.12	**DG SET WITH PLC BASED AMF PANEL**				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supplying, installation, testing & commissioning of Radiator Cooled type Diesel Generating Set comprising of multicylinder diesel oil engine with radiator, fly wheel, exhaust piping upto silencer, residential type silencer, electric starting equipments, batteries, battery charger, directly coupled to an alternator of suitable capacity at 0.8 P.F. 3 phase, 4 wire 50 Hz 415 volts, A.C supply complete with base plate antivibration mountings foundations for installation of D.G. Set,terminating arrangement for outgoing cables, control panel, controlling MCCB etc, complete of exhaust pipe installation with support arrangement as required as per specifications, Drawings and specified ambient conditions				
	DG Sets shall be suitable for Auto Start, Auto Stop and Auto Load Management.				
12.1	**630 KVA D.G. SET (INCLUDING PLC BASED AMF PANEL)**	Set	1	5807739	**5807739**
	Supply, erection, testing and commissioning of floor mounted totally enclosed sheet steel AMF Panel with PLC suitable for automatic operation of 630 **k**VA DG set and equipped with automatic gas flooding using linear heat sensing tube type fire trace system or equivalent. The panel shall be suitable for 415 V, 3 phase, 4 wire system, **Copper bus bars** designation labels as per requirement, continuous earth bus, cable clamping supports, panel illuminating lamps, cable gland plates for incoming and outgoing feeders as per details below:	Set	1	2841211	**2841211**
(a)	**INCOMING** 1 nos. 1000 A, 50 KA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable				
(b)	**OUTGOING**				
(i)	1no. 630 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable.				
(ii)	1no. 400 A, 50 KA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable.				
(c)	1 No., 230V, AC operated integrated type Digital Multi function meter for measuring Frequency, Amperes ,Voltage, Energy & Power factor of appproved makes conforming to specifications, latest IEC/ EMC and EMI standards, with necessary Circuit MCBs and suitable size CTs for above two incomer metering supporting SCADA / BMS connectivity				
(d)	One set of ***"Battery charger"*** consisting of :				
(i)	Transformer/Rectifier				
(ii)	DC. Ammeter				
(iii)	DC. Voltmeter				
(iv)	Charging rate selector switch (OFF/Trickle/Boost.)				
(e)	One Mains supply Voltage monitor				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
(f)	One set of DC Control relays incorporating engine Start/Stop, three attempts starting facility and failure to start lock out.				
(g)	One set of auxiliary relays for automatic closing and opening of the alternator contactor for automatic operation as required.				
(h)	6 nos. potential free contacts for BMS				
(I)	One selector switch Auto/Manual/ Test				
(j)	One set of the following :				
(i)	One Selector switch for engine control OFF/ON				
(ii)	Four Push buttons, Start, Stop, Reset, Test.				
(iii)	Two Indicating lamps "Load on set" "Load on Mains".				
(iv)	Five Indication on annunciator for shutdown for "Low lube oil pressure", "High water Temperature", "overspeed", "low fuel" & "set fails to starts".				
(k)	One counter to indicate number of times set has operated.				
(l)	One **Hour meter** to indicate the number of hours set has operated				
(m)	The AMF panel shall include necessary internal wiring, control circuit fuses, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required				
(n)	Power Pack for the PLC backup of the DG set with all arrangement, including battary, Control Circuits, Internal wiring, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required				
12.2	**FUEL SYSTEM**	Lum	1		
a	Supplying, installation, testing and commissioning of heavy duty Hand cranking oil pump with 3 mtr. Long flexible oil hose.	Nos	2		
b	Supplying, installation, testing and commissioning of 990 Day Oil fuel steel tank of under mentioned capacities made out of 5 mm thick M.S. sheet with float valve and low level alarm arrangement including fuel oil piping up to the set valves etc. complete as required.	Nos	2		
c	Supplying, installation, testing and commissioning of Suitable rating Fuel Oil pump including foundations, piping, valves, indications, safety devices etc. complete as required.(Crompton / GE / Kirloskar make)	Nos	2	555500	**555500**
d	MS C class 25mm fuel pipe	Mtrs	Lum		
e	Ball Valve 25mm	Nos	2		
	The Contractor scope of inspection and approval for getting the layout drawing, installation, license from Electrical Inspectorate local authority, explosive department,HERC for Campus complete as required for satisfatory function of the installation of above DG Sets				

(Attachment No-6 to Addendum No-1) PART-B DEP-LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	The contractor shall submit back-pressure calculations in support of exhaust pipe size for each DG Set.				
	TOTAL FOR E.12 (DG SET)				**9204451**
E.13	**OHE ON OFF INDICATOR**				
13.1	Supply of 25KV AC OHE (Presence / Absence Indicator)	Nos.	4	102811	**411243**
13.2	Erection of 25KV AC OHE (Presence / Absence Indicator)	Nos.	4	8998	**35992**
13.3	Supply, testing and commissioning of 1100 volt grade, 1.5 sq mm, 3 core **FRLS** copper cable conductor (armoured)	RM	2400	97	**231977**
13.4	Laying and fixing of conductor cables on existing cable trays/ wall with heavy GI clamps with base and provide the cables tags / cable / route marker at both end of cable. 1100 volt grade 1.5 sqmm, 3 core **FRLS** copper cable.	RM	2400	22	**53328**
13.5	Supply and fixing of 50 mm X 2 mm GI angle with fasteners	RM	75	622	**46662**
	TOTAL FOR E.13 (OHE ON OFF INDICATOR)				**779202**

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
H.01	**AIRCONDITIONING SYSTEM WITH VRV/VRF**				
1	**Air Cooled VRV System**				
	Design, Supplying, installing, testing and commissioning of Air Cooled Variable Refrigerant Volume/ Veriable Refregent Flow System suitable for R410A and 415V, 50 Hz, AC supply. The unit shall consist of indoor units and external condensing units and other accessories complete in all respects. The unit shall be fully charged with gas and oil.				
2	**Outdoor Unit**				
	Design, Supplying, installing, testing and commissioning of Modular Type Outdoor Condensing Units equipped with highly efficient Inverter scroll compressors to work on 415 V, 50 Hz AC suply with digital/ inverter technology, special acryl precoated heat exchanger, low noise condenser fan with motor, auto check function for errors in display panel, auto address setting, as per specifications. The units shall be complete with necessary mounting frames.				
	The units shall be complete with necessary mounting frames				
a	12HP	Nos.	17	342327	5819557
b	16HP	Nos.	20	446224	8924485
3	**Indoor Units**				
3.1	Design, Supplying, installing, testing and commissioning of Wall Mounted Type Indoor Units each complete with coil, filter, cordless remote etc. Air conditioners with evaporating unit comprising of cooling coil, blower with motor and 220 volt, 1 phase, 50 Hz, AC supply all and as per specifications. The rate will also include entire drain pipes and nothing extra shall be payable.				
a	1 TR	Nos.	31	35806	1109999
b	2 TR	Nos.	42	39091	1641802
d	3.3 TR	Nos.	46	78468	3609515
3.2	Design, Supplying,, installation, testing and commissioning of Centralized Remote controller with scheduler for operation of indoor units.	Nos	9	37529	337758
3.3	Design, Supplying,, installation, testing and commissioning of Imported fittings Y-joints, distributor and headers for all Indoor units as per layout drawings.	Nos	78	15476	1207119
3.4	**Scheduled Timer**				
	Design, Supplying,, installation, testing and commissioning of Scheduled Timer.	Nos	9	7766	69893
	Notes:				

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1)	**The vendor may offer the outdoor units as per availability from the manufacturer, however keeping the tonnage same as per BOQ subject to approval by MMRC.**				
2)	**The indoor units capacity can be also as per availability from the manufacturer but keeping the minimum capacity as required in BOQ subject to approval by MMRC.**				
4	**Refrigerant Piping for VRV/VRF system**				
	Design, Supplying, installing, testing and commissioning of interconnecting refrigerant pipe work with elastomeric nitrile rubber/closed cell expanded polythene tubular insulation between each set of indoor & outdoor units as per specifications, all piping should be laid on Galvanised/Powder Coated tray supported by Galvanised M S Hangers & Clamps. The rate also includes cost of Y-joints, distributer and headers in the refrigeration piping system wherever required. The rate also includes items required to complete the piping work and nothing extra should be payable.				
4.1	41.3 mm O.D. (Outer dia) (insulation: 19 mm)	RM	40	2683	107323
4.2	34.9 mm O.D. (Outer dia) (insulation: 19 mm)	RM	40	2369	94746
4.3	28.6 mm O.D. (Outer dia) (insulation: 19 mm)	RM	310	2009	622693
4.4	25.4 mm O.D.(Outer dia) (insulation: 19 mm)	RM	190	2009	381651
4.5	22.2 mm O.D. (Outer dia) (insulation: 13 mm)	RM	180	1579	284172
4.6	19.1 mm O.D. (Outer dia) (insulation: 13 mm)	RM	180	1342	241576
4.7	15.9 mm O.D. (Outer dia) (insulation: 13 mm)	RM	180	1077	193781
4.8	12.7 mm O.D. (Outer dia) (insulation: 13 mm)	RM	180	995	179182
4.9	9.5 mm O.D. (Outer dia) (insulation: 13 mm)	RM	130	851	110633
4.1	6.4 mm O.D. (Outer dia) (insulation: 13 mm)	RM	250	677	169150
5	**Control Cum Transmission Wiring**				
	Design, Supplying, installing, testing and commissioning of control cum transmission wiring of 2 core x 1.5 sqmm copper FRLSH, XLPE insulated cable in suitable GI conduits accessories between indoor and outdoor units. Necessary securing of conduit shall be made by contractor. After completion of work wall and floor shall be repaired and brought to its original finish. The rate will also include cost of laying of GI conduit between indoor and outdoor units.	RM	1500	263	394961
6	**AIR COOLED SPLIT TYPE DUCTABLE AIR-CONDITIONER / SPLIT UNITS**				
6.1	**Air Cooled Split type wall mounted Air conditioners**				

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Design, Supplying, installing, testing and commissioning of Air Cooled Split type wall mounted Air conditioners with evaporating unit comprising of cooling coil, blower with motor and condensing unit comprising hermetically sealed rotary compressor, condenser coil, and propeller fan. Unit shall be complete with controls, interconnecting copper refrigerant piping with insulation, drain pipes and electrical cabling etc. between evaporative and condensing unit, refrigerant gas and oil and complete as per specifications. The unit shall be suitable for operating on 240 volt, 1 phase, 50 Hz AC supply with five star energy rating. The units shall be suitable for chorded remote operation. The refrigerant piping & cabling shall run in PVC sleeve Steel supporting structure for outdoor units suitable for wall mounting / floor mounting. Nothing extra shall be paid on any account i.e. refrigerant pipes, drain pipes etc.				
a)	Capacity 1 TR	Nos	6	45912	275472
b)	Capacity 1.5 TR	Nos	6	74818	448908
c)	Capacity 2.0 TR	Nos	8	93746	749969
6.2	Providing, fixing and testing of copper refrigerant piping of appropriate sizes duly insulated with nitrile rubber insulation of 6mm/9mm thickness for all types of split AC units. The pipes plus nitrile rubber insulation are to be covered with PVC flexible conduits for protection.				
a)	12.7 mm/6.3 mm copper refrigerant pipe	RM	120	669	80327
b)	15.6 mm/9.3 mm copper refrigerant pipe	RM	120	792	95028
6.3	**Condensate Drain Piping:**				
	Providing, fixing and testing GI Class B drain piping for condensate from unit to nearest suitable drain system as per site conditions as per instructed at site engineer complete with all required fittings and providing clean out plug at suitable location for the pipe when required complete with 6mm thick elastomeric nitrile rubber insulation over GI pipe:				
	32mm Dia.	RM	90	523	47054
	25mm Dia.	RM	185	409	75679
	TOTAL OF HEAD-H01				**27272433**

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
H.02	**VENTILATION SYSTEM**				
1	Design, Supplying,, installation, testing and commissioning of following equipment .				
1.1	**Propeller Type Fans**				
	Design, Supplying, installing, testing and commissioning of Propeller type fan complete with motor suitable for 220 volt, 1 phase, 50 Hz AC supply, mounting frames and louvers and complete as per specifications.				
	Size 610 mm dia	Nos.	14	15551	217709
	Size 450 mm dia	Nos.	10	7320	73204
	Size 380 mm dia	Nos.	15	5675	85125
	Size 300 mm dia	Nos.	20	5188	103767
1.2	**Axial Flow Fans**				
	Design, Supplying,, Installation, Testing and Commissioning of axial flow fans for the following capacity. Fan shall be supplied with GI gravity louvers, bird screen and fan guard.				
	17000 CMH - 25 mm WG St Pr.	Nos	6	74326	445955
	6800 CMH - 20 mm WG St Pr.	Nos	4	47284	189137
	5440 CMH - 20 mm WG St Pr.	Nos	4	44107	176427
	2500 CMH - 15 mm WG St Pr.	Nos	30	37741	1132220
	1200 CMH - 15 mm WG St Pr.	Nos	12	21442	257308
	936 CMH - 15 mm WG St Pr.	Nos	8	21442	171538
1.3	Design, Supplying, Installing, Testing and Commissioning of Tube Axial Flow fans with back draft gravity dampers, adjustable pitch blade, GSS/MS casing, cast aluminum alloy impeller complete with TEFC Sq. cage induction motor with class 'F' insulation , 1450 RPM, suitable for 415 volts +/- 10%, 50 Hz+/- 3%, three phase AC supply with support, mountings and flexible connection etc. & of following capacity.				
	13500 CFM (20 mm static pressure)	Nos.	1	81186	81186
	7000 CFM (20 mm static pressure)	Nos.	1	50582	50582

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.4	Design, Supplying,, installation, testing and commissioning of ceiling suspended Inline fans complete with Louvers,bird screen,speed regulator, rain guard, 5m length copper cable, earthing wire all compete as required of following capacities and shop drawing mentioned.				
	850CFM ,15mm St.Pr.	Nos	1	40995	40995
	1700CFM ,15mm St.Pr.	Nos	1	57003	57003
	Note:- All inline fans should be single phase supply with 3 speed regulators etc.				
1.5	Design, Supplying, , Installation testing & Commissioning of Air Curtain 1200mm width & door height 7 to 8Ft .Velocity 20-22 MPS	SET	1	32245	32245
1.6	Design, Supplying,, installation, testing and commissioning of synthetic fill pad type air washer at 500 FPM velocity across pads giving 90% adiabatic saturation efficiency, DIDW Class-I backward curved centrifugal fan with TEFC weather proof, High efficiency motor of IP:55 protection suitable for 415 +10% Volts, 3 phase, 50 cycles power Design, Supplying,, mounted on a common base , multi sleeve pulleys for fan and fan motor. The fan capacity shall be based on outlet velocity not exceeding 2000 FPM, complete with 8" thick celdek fill, 3mm thick FRP steel reinforced tank, water pump 2 Nos. (1+1), cover pipe, distribution pipe, distribution pan, filters at air inlet, water piping, make up water with ball valve, drain and overflow connection, all housed in double skin casing mounted on vibration isolators complete in all respects as per specifications.				
	8000 CFM with 50mm Static Pressure , rating 3.0 kW	Nos.	1	215223	215223
1.7	Design, Supplying,ing, Installing, Testing and Commissioning of Wet Scrubber . complete with fan, double skin casing, FRP coated steel tank, DIDW centrifugal backward curved fan with V belt drive motor monoblock pumps complete with all fittings as per specification.				
	Scrubber duct shall be in 18 G				
	Capacity 4500 CFM static pressure 65mm blower motor rating 2.2 kW	Nos.	1	208654	208654
	TOTAL OF HEAD-H02				**3538277**
3	**AIR DISTRIBUTION SYSTEM**				
	G.I. Sheet Metal Ducts				

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.1	Design, Supplying, installing, testing and commissioning of factory fabricated G.I. Sheet metal ducts(275 GSM) with flanges complete with supports, vanes, links, levers and quadrants etc. as per specifications and drawings. The rates shall include all materials of the duct and labour for suspension and supporting arrangement for plenums, ducts, complete with fire retardant flexible connection as required and as per specifications.				
3.2	0.63mm (24 Gauge)	Sqm	120	1211	145319
3.3	0.80 mm (22 Gauge)	Sqm	95	1510	143436
3.4	1.00 mm (20 Gauge)	Sqm	20	1741	34819
3.5	1.25 mm (18 Gauge)	Sqm	20	2033	40663
H03	**Grills and Dampers**				
1	**G.I Dampers**				
	Design, Supplying, installing, testing and commissioning of G.I construction Duct Dampers for Controlling the Airflow in Ducts as per specification..	Sqm	1	8327	8327
2	**Grilles without Dampers**				
	Design, Supplying, installing, testing and commissioning of powder coated extruded aluminum sections grills as per specification.	Sqm	1	8327	8327
3	**Grilles with Dampers**				
	Design, Supplying, installing, testing and commissioning of powder coated extruded aluminium section grills with dampers for supply air terminal for air-conditioning as per specification..	Sqm	70	12904	903299
4	**Linear Grills**				
	Design, Supplying, installing, testing and commissioning of powder coated extruded aluminium section Linear grills supply / Return air as per specification..	Sqm	25	8615	215365
5	**Exhaust/Fresh Air Louvers**				
	Design, Supplying, installing, testing and commissioning of exhaust air/fresh air louvers of powder coated extruded aluminium construction with bird screen, minimum 80 mm deep, as per specification.	Sqm	45	17252	776357
6	**Fire Dampers**				

(Attachment No-6 to Addendum No-1) PART-B - Depot VAC WORKS (AIRCONDITONING SYSTEMS WITH VRV/VRF, SPLIT AC FOR OTHER DEPOT BUILDING)					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Providing, fixing, testing and commissioning of duct/ wall mounted GI Fire dampers suitable with spring return type motor actuator for automatic damper operation and interlocking with Fire Alarm System Panel, 90 minute fire rating, CBRI approved as per specification.	Sqm	2	6543	13086
7	Design, Supplying, installation, testing & commissioning of external thermal insulation on ducts with closed cell cross linked Polythylene (XLPE) foam of density 33 Kg/m3 with 13 mm thick & thermal conductivity not exceeding 0-035 w/mk at an average temp of 40 oc. The material shall be rated as class 1 as per BS 476, part7. the smoke density as per AS-1530.3 shall not exceed 1. the material shall have fire approval fron CBRI, rorkee and no toxicity under flamming & non-flaming condition as per AITM 3.000 (1993). Adhesive used for setting the insulation shall be non-flamable vapour proof. all joints should be sealed with 3mm thick, 50mm wide PE tape & flange to be overlapped with 6" width of same material thickness. finally duct insulated should be strapped by 12mm plastic packing strip at every random meter & conforming to standard specification.	Sqm	5	630	3150
	13mm thick closed cell cross linked polyethylene (XLPE) foam with factory laminated Aluminium PE foil for supply air duct.				
8	Design, Supplying and fixing of accoustic lining of duct with fiber glass rigid board of density 48 kg/m3 sealed in fiberglass tissue paper and covered with 0.5mm perforated aluminium sheet & conforming to standard specification. 12mm thick fiber glass rigid board.	Sqm	5	953	4763
	TOTAL FOR H.03				**2296911**
	TOTAL OF ALL				**33107620**

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-criteria detectors below false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	425	1555	661045
2	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-criteria detectors above false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	20	1555	31108
3	Supply, installation, testing and commissioning of plug-in type rate of rise cum fixed temperature addressable analogue Heat detectors including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	25	1444	36108
4	Supply, installation, testing and commissioning of '4" Loop (750 Detectors, 400 Devices) (Fire Alarm Capability: 1 Loop x 99//125/150 detectors/ devices) wall recess mounting microprocessor based analogue addressable Fire Control Panel expandable by minimum 2 additional loops (Fire loop shall be closed type) with minimum 80 character LCD display, 4 access levels, 1000 events historical logging, flash E-PROM, 240 volts ac power supply, automatic battery charger, 24V SLA batteries suitable for operating the entire system including the talk back units and the hooters/strobes for a minimum of 8 hours in battery condition. The Panel shall have suitable power amplifiers for hooter/strobes. The Panel shall be capable of being Integrated with the BMS System and shall include cost of supply and installation of any additional modules or interfaces required for the same. The pannel shall be complete as per specifications and as required.	Nos.	1	83325	83325
5	Supply, installation, testing and commissioning of Repeater panel including the cost of mounting accessories complete as per specifications and as required	Nos.	1	55550	55550
6	Supply installation testing and commissioning of dust and vermin proof addressable analogue Manual Call Boxes to initiate audio visual alarm including the cost of mounting accessories complete as per specifications and as required.	Nos.	50	2333	116655
7	Supply installation testing and commissioning of addressable analogue Talk Back jacks with face plates for Fireman's Handsets to initiate audio conversation with Main Fire Alarm Panel including the cost of mounting accessories complete as per specifications and as required.	Nos.	28	6374	178485
8	Supply, installation, testing and commissioning of Wall/ Ceiling mounting Sounder & strobes for visual indication including the cost of mounting accessories complete as per specifications and as required.	Nos.	50	1222	61105

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
9	Supply, installation, testing and commissioning of Control Modules including the cost of mounting accessories complete as per specifications and as required.	Nos.	50	2333	116655
10	Supply, installation, testing and commissioning of Monitor Modules including the cost of mounting accessories complete as per specifications and as required.	Nos.	44	2333	102656
11	Supply, installation, testing and commissioning of Fault Isolator Modules including the cost of mounting accessories complete as per specifications and complete as required.	Nos.	44	2111	92880
12	Supply installation testing and commissioning of two way Talk Back handsets to initiate audio interface complete as required.	Nos.	15	13970	209547
13	Supply, installation, testing and commissioning of wall or ceiling mounted 240 Volt AC illuminated double sided pictorial exit signs provided with appropriate direction arrow painted in green on white with an 11W CFL Lamp including the cost of in-built rechargeable batteries with charger suitable for 90 minute operation and including the cost of accessories for surface/ recessed or ceiling suspended mounting complete as required.	Nos.	15	7658	114865
14	Supply, installation, testing and commissioning of Response Indicator Lamp assembly in a dust tight sheet steel enclosure as per detailed specifications including accessories for recess mounting as per approved sample as required.	Nos.	150	244	36663
15	Supplying, Laying, Termination, Testing and commissioning of size**2C x 1.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	3,500	72	252753
16	Supplying, Laying, Termination, Testing and commissioning of size**2C x 2.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	3,500	79	276084
17	Supplying, installing, testing and commissioning of following sizes 16 gage GI conduits recessed/surface as required including clamps, hardwares etc required for conduiting arrangement complete as per specifications. (Quoted price shall include GI flexible conduits to connect from ceiling to false ceiling)				
a)	20 mm dia	Mtrs.	150	149	22364
b)	25 mm dia	Mtrs.	3,500	171	598829
	TOTAL FOR F.01				**3046677**
F.02	**FIRE FIGHTING SYSTEM**				

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.1	Providing, laying, jointing and testing in trenches the following sizes of G.I. class `C' (heavy class) pipes conforming to IS:3589 & IS:1239 with accessories like fittings including tees, elbows, reducers, flanges, rubber gaskets, GI nuts, bolts and washers and providing protection to embedded ~~MS~~ G.I. pipes and fittings by applying pypkote primer (@ 100 gm/sqm) thereafter wrapping 4 mm thick pypkote (AW 4 mm) protection coating by thermo fusion process. Overlap shall be maintained at 15 mm. The application process shall be strictly according to manufacturer's specification, inclusing necessary excavation trenches and refilling as required. **(For under ground works)**				
1.1.1	80 mm dia	Mtrs.	250	1133	283305
1.1.2	100 mm dia	Mtrs.	250	1533	383295
1.1.3	150 mm dia	Mtrs.	6,400	2166	13865280
1.1.4	200 mm dia	Mtrs.	10	2977	29775
1.2	Providing, laying, jointing, testing and commissioning of following sizes of pipes conforming to IS:3589 & IS-1239 with all accessories like all fittings (standard G.I. fitting with welded joint shall be used on the pipes) including tees, elbows, reducers, union, flanges, rubber gaskets, GI nuts bolts, washer including supporting/fixing the pipe on floor / wall /ceiling with clamps, hangers (using anchor fastners) or angle iron support work in trenches as per specification. G.I. pipe sleeve of suitable higher size shall be provided wherever the pipes are crossing the walls/floors and sealing the sleeves with glass wool in between & fire sealent compound at either end all as per Project Manager's / Consultants requirements including cutting holes and chases in brick and making good the same to original conditions complete in all respects. **(For above ground works)**				
	All hangers, clamps, brackets etc. shall be of galvanized iron unless specified otherwire and then supply of the same shall also be included for rates under this head. Including two coats of synthetic enamel paint of approved shade over a coat of primer. Prior to application of primer the surface should be cleaned for any dirt, rusts, rough substance etc. Including painting of legends both direction arrow as per the approval of the Project Manager.				
	Welding of any kind on galvanized support / hanger shall not be permitted				
1.2.1	25 mm dia	Mtrs.	100	344	34441
1.2.2	32 mm dia	Mtrs.	100	444	44440
1.2.3	40 mm dia	Mtrs.	40	500	19998
1.2.4	50 mm dia	Mtrs.	50	700	34997
1.2.5	65 mm dia	Mtrs.	50	822	41107
1.2.6	80 mm dia	Mtrs.	350	1033	361631
1.2.7	100 mm dia	Mtrs.	350	1422	497728

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.2.8	150 mm dia	Mtrs.	400	2222	888800
1.2.9	200 mm dia (wall thickness 6 mm.)	Mtrs.	10	2722	27220
1.2.10	250 mm dia (wall thickness 6 mm.)	Mtrs.	10	3389	33886
1.3	Providing & fixing controlled RRL fire hose pipe (as per IS:636) of 63 mm dia and 15 meter length rated for brust pressure of 35.7 Kg/sqcm. Hose shall be complete with ISI marked S.S male & female coupling (IS:903) bound & riveted to hose pipe with copper rivets & 1.5 mm copper wire.	Each	272	4524	1230613
1.4	Providing and Fixing stainless steel 63 mm dia instantaneous pattern branch short pipe, 20 mm dia nozzle conforming to IS 903, suitable for inter connection to hose pipe coupling complete as required.	Each	136	2076	282313
1.5	Constructing masonry chamber 90x90x120 cms inside with 75 class designation brick work in cement mortar 1:5 (1 cement : 5 fine sand) for valve with 560 mm dia. SFRC Manhole cover with frame (Heavy duty) and R.C.C. top slab 1:2:4 mix (1cement:2 coarse sand : 4 graded stone aggregate 20 mm nominal size) necessary excavation foundation concrete 1:5:10 mix (1 cement : 5 fine sand and 10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1cement :3 coarse sand) 12 mm thick finished with a floating coat of neat cement complete as per standard design with FPS bricks.	Nos.	10	12973	129726
1.6	Providing & fixing Gun Metal fire brigade connection unit consisting of 4 No. 63 mm dia instantaneous type male couplings with built-in check valves, 1 No., 150 mm dia flanged outlet complete with bolts, nuts and rubber insertions as required and as per IS standards	Each	6	16998	101990
1.7	Providing & fixing Gun Metal fire brigade suction hose coupling (draw-out connection) with nut for female coupling as per IS standards complete with 100 mm dia GI suction pipe and 100 mm dia foot valve (to be connected to static tank). Provision of GI drop pipe and foot valve shall be made in all the fire water static storage tanks (2 No) (GI pipe to be paid separately through appropriate item while cost of foot valve to be included).	Each	1	5965	5965

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.8	Providing & fixing Stainless steel cabinet (to enclose FB connection,draw off connection & for external hydrants) fabricated from 16 g sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx 0.75m x 0.6m x 0.25m)	Each	6	16607	99643
1.9	Providing and fixing single acting air release valve with screwed inlet 20 mm dia.	Each	22	1968	43292
1.10	The rate shall include supply and fixing **Gun metal ball valve** CI hand wheel suitable for pressure 15 Kg/sqcm. and confirming to relevant IS of the following size including providing necessary union/flange and making proper connection for air testing and drainage system.				
1.10.1	50 mm dia	Nos	14	5666	79325
1.11	Providing and fixing pre fabricated 4 mm thick glass door (with SS frame) of size 2.1 m x 0.9 m with center opening for fire hose cabinet suitabely marked on the outside with the letters "FIRE HOSE" including locking arrangement suitable to accommodate 1 No Hydrant landing valves, 1no fire hose reel, 2 Nos.15 m long 63 mm dia hose pipe,1 no branch pipe, 1No. fire man's axe and 2 Nos fire extiguishers.	Each	31	23870	739969
1.12	Supplying and fixing of hose cabinet fabricated from of size 900 mm x 600 mm x 450 mm made of 3 mm aluminium sheet with 6 mm thick glazed glass doors i/c necessary locking arrangement suitable to accommodate external hydrant with butter fly valve, 2 Nos.15 mtr. Long Hose pipe, 1 No. branch pipe, mounted on wall OR raised brick platform 600mm in height built in brick masonary in cement mortat 1:5, 12mm thick plaster on all sides and finished with existing/ proposed external finish & duly painted with Post office red externally and white internally with synthetic enamel paint completein all respect, for external hydrants, as required.	Each	100	10666	1066560
1.13	Providing and fixing dial type pressure gauge (SS casing) with isolation cock and pipe.		.		
1.13.1	Dial diameter 100 mm caliberation 0-15 kg	Each	40	1444	57772
1.14	Providing & fixing butterfly valve tested to a pressure not less than 15 Kg/Sq.cm. Including rubber gasket, flanges, nuts, bolts, washers & painting complete as required.				
1.14.1	65 mm dia	Each	10	3222	32219
1.14.2	80 mm dia	Each	10	3555	35552
1.14.3	100 mm dia	Each	10	4555	45551
1.14.4	150 mm dia	Each	80	6555	524392
1.14.5	200 mm dia	Each	8	16332	130654
1.15	Providing & fixing dual plate CI wafer type check valve tested to a pressure of 15 Kg/sqcm. Including rubber gasket, flanges, union, nuts, bolts, washers & painting complete as required.				
1.15.1	65 mm dia	Each	18	3333	59994
1.15.2	100 mm dia	Each	18	5555	99990
1.15.3	150 mm dia	Each	24	9777	234643

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.16	Designing, providing and fixing Orifice plate made out of stainless steel plate (thickness as per specification) for 80/100/150 mm dia. pipe to reduce pressure upto 3.5 Kg/sqcm complete in all respects.	Each	136	1555	211534
1.17	Providing and fixing standard firemans axe with heavy rubber handle.	Each	13	667	8666
1.18	Providing and laying non-pressure NP2 class (light duty) R.C.C pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc.complete.				
1.18.1	250 mm dia. **R.C.C pipe**	Mtr.	100	929	92936
1.2	Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) all-round R.C.C pipes including bed concrete as per standard design.				
1.19.1	250 mm dia. **R.C.C pipe**	Mtr.	100	3304	330403
1.20	Providing & fixing brass quartzoid sprinklers (UL approved) of 15 mm dia size, suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :				
1.20.1	Spray recessed (adjustable) without rossette (ss) (68 deg.C) standard sprinkler (Pendant / Upright Type)	Each	850	333	283305
1.20.2	Supplying 15 mm size quartzoid bulb type sprinklers ,of rating 68 degree C. pendent / upright with required accessories. (spare)	Each	20	333	6666
1.21	Providing and fixing inspector's test assembly complete with test value, sight glass sectional drain valve union with corrosion resistant orifice all complete	Each	10	8304	83042
1.22	Supply, installation, testing and commissioning of electrically driven multistage, single outlet high pressure centrifugal type fire hydrant /sprinkler pump, suitable for automatic operation consisting of the following:	Each	2	411070	822140
	Horizontal multistage, single outlet, **split casing** centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ AC supply. The installation shall be complete with flexible coupling and coupling guard as required. Fire pump shall have CI casing, CS diffusers, bronze impeller (hard finished and dynamically balanced) and SS (304) shaft with mechanical seal, capable for **delivering 2850 LPM at outlet head of 90 mtrs.** to ensure a minimum pressure of 3.5 Kg/Sqcm at the farthest or topmost hydrant / sprinkler. The installation shall be complete with necessary pressure gauge on delivery side.				
	Squirrel cage induction motor, TEFC type suitable for operation on 415 volts, 3 phase 50 HZ A.C supply, for the above pump with synchronous speed of **1500 RPM,** conforming to IP 55 protection & class F insulation. The motor shall conform to IS 325-1978 (up to date).				
	Common base plate for (a) and (b) from M.S. Channel for required size.				
	Supply, installation, testing and commissioning of **Jockey pump** (pressurisation pump) comprising of the following:				
	Vertical centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ A.C supply. The installation shall be complete with Flexible coupling and coupling guard, complete as required.				

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.23	The pump casing shall be SS, shaft shall be SS & impeller/ shaft sleeve/casing wearing ring shall be bronze. The pump shall be provided with mechanical seal The system shall be complete with necessary pressure gauge with gun metal shut off cock on delivery side. Squirrel cage induction motor TEFC type for operation on 415 V, 3 phase 50 Hz AC supply for the above pump with a synchronous speed of **2900 RPM** as required. Common base plate for (a) and (b) from M.S. channel as required size. For pump defined above & of duty as follows : Flow : **180 LPM** Head : **90 MTRS**	Each	1	94435	94435
1.24	Providing, fixing, testing and commissioning of precharged air vessel (size 450 mm dia & 2000 mm height) for pressurization of hydrant / sprinkler system complete with adequate pressure switches (as per design/requirement) with valves to operate as per operating sequences including 25 mm dia drain valve, air release valve with stop cock on the top, 100 mm dia inlet with isolating valve duly painted from inside and outside complete as required.	Each	1	22220	22220
1.25	Providing and fixing **200 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Each	2	25886	51773
1.25.1	Providing and fixing **80 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Each	1	7222	7222
1.26	Providing and fixing carbon-di-oxide type fire extinguishers consisting of welded M.S. cylinderical body, squeeze lever discharge valve fitted with pressure indicating gauge internal discharge tube 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket conforming to IS:15683 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge.				
1.26.1	Capacity **4.5 Kg.**	Each	110	4555	501061
1.27	Providing and fixing mechanical foam type fire extingushers consisting of welded M.S. trolley mounted cylindrical body, squeeze lever discharge valve fitted with pressure discharge hose, discharge nozzle, trolley etc., ISI marked as per IS:13386 finished externally with red enamel paint.				
1.27.1	Capacity **50 lit** (D.G.Room)	Each	1	6555	6555
1.28	Providing and fixing carbon-di-oxide fire extingushers trolley mounted with all accessories internal discharge tube,high pressure discharge hose,discharge nozzle, ISI marked as per IS:2878 finished externally with red enamel paint.				
1.28.1	Capacity **22.5 kg.**	Each	4	14332	57328

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.29	Providing and fixing ABC Powder type fire extinguishers consisting of welded M.S. cylinderical body, squeeze lever discharge valve fitted with pressure indicating gauge internal discharge tube 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket conforming to IS:15683 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge.				
1.29.1	Capacity **6.0/5.0 Kg.**	Each	40	2810	112415
1.30	Providing and fixing fire extinguisher water type of capacity **9 litre** with internal plastic lining and IS marked as per IS 940 with gun metal cap, CO2 cartridge and initial refill.	Each	12	1889	22664
1.31	The rate shall include providing two coats of synthetic enamel paint of approved shade over two coats of primer on pipes, fittings and supports, including painting of legends both direction arrow as per the approval of the Engineer.				
1.31.1	25 mm dia	Mtrs	100	20	2000
1.31.2	32 mm dia	Mtrs	100	22	2222
1.31.3	40 mm dia	Mtrs	40	28	1111
1.31.4	50 mm dia	Mtrs	50	33	1667
1.31.5	65 mm dia	Mtrs	50	39	1944
1.31.6	80 mm dia	Mtrs	350	44	15554
1.31.7	100 mm dia	Mtrs	350	50	17498
1.31.8	150 mm dia	Mtrs	400	56	22220
1.31.9	200 mm dia	Mtrs	10	67	667
1.31.10	250 mm dia	Mtrs	10	78	778
1.32	The rate shall include supply and fixing double flanged flexicon rubber expansion joint with unit control of standard length. Tested to a pressure of 15 Kg/sqcm including rubber gaskets, flanges, nuts, bolts and washers complete as required and as per specifications.				
1.32.1	80 mm dia	Nos.	2	7676	15352
1.32.2	200 mm dia	Nos.	4	16468	65871
	TOTAL FOR F.02				**24407311**
F.03 A	**CLEAN AGENT BASED PANEL FLOODING SYSTEM -FIRE TRACE TUBE SYSTEM**				
1	Supply, fixing, testing and commissioning of UL 521, UL listed Polymer Tube Detection based Clean Agent **Fire Suppression** System for Electrical Panels, consisting of the following components:				

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.1	Direct Low Pressure Clean Agent system **10 LBS** capacity, complete with Clean agent) **(NOVEC 1230 or equivalent)**, D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and: **INCLUDING**	NO.	10	76659	766590
1.1.1	Fill Port				
1.1.2	Outlet Port				
1.1.3	End of Line Adaptor,				
1.1.4	End of line Adopter				
1.1.5	Pressure switch				
1.2	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.o make each entire system functional - 2 Nos.	Mtrs.	400	1055	422180
1.3	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	NO.	10	15554	155540
2	Providing and fixing set of 4 fire buckets capacity 9 ltrs fabricated from 24 gauge MS sheet brackets filled with jamuna sand, two coats of anti corrosive paint inside and outside and two coats of white enamel inside and two coats of postal red enamel outside with " FIRE" marked on each bucket, including M.S. fabricated 4 bucket standard size with 4 hooks. For Hanging buckets including painting with two coats of anti corrosive primer and two coats of postal red enamel on all surfaces of approved quality and make complete in all respects.	No.	8	2000	15998
F.03 B	**CLEAN AGENT BASED PANEL FLOODING SYSTEM -FIRE TRACE TUBE SYSTEM**				
1	Direct Low Pressure Clean Agent system **5 LBS** capacity, complete with Clean agent **(NOVEC 1230 or equivalent)**, D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and: **INCLUDING**	NO.	10	69993	699930
1.1.1	Fill Port				
1.1.2	Outlet Port				
1.1.3	End of Line Adaptor,				
1.1.4	End of line Adopter				
1.1.5	Pressure switch				
1.2	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.o make each entire system functional - 2 Nos.	Mtrs.	400	1055	422180

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1.3	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	NO.	10	15554	155540
	Note: The items indicated above are notable items. The vendor to include all allied and implid items in required quantity at no extra cost.				
	TOTAL FOR F.03				**2637958**
F.04	**FM 200 FIRE SUPPRESSION SYSTEM**				
A	**SIGNALLING EQUIPMENT ROOM (SER)**				
1	120 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	2	105545	211090
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	208	2586	537805
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	53328	53328
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	1	38380	38380
5	Manifold check valve	Nos.	2	21210	42420
6	Discharge pressure switch	Nos.	1	18685	18685
7	Discharge nozzles	Nos.	4	5454	21816
8	Cylinder bracket	Nos.	12	1010	12120
9	Manifold for connecting 2 cylinders	Lot	1	14140	14140
10	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
B	**TELECOM EQUIPMENT ROOM (TER)**				
1	80 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	2	98172	196344

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	146	2586	377498
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	53328	53328
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	1	38380	38380
5	Manifold check valve	Nos.	2	21210	42420
6	Discharge pressure switch	Nos.	1	18685	18685
7	Discharge nozzles	Nos.	2	5454	10908
8	Cylinder bracket	Nos.	4	1010	4040
9	Manifold for connecting 2 cylinders	Lot	1	14140	14140
10	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
C	**UPS ROOM**				
1	120 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	3	105545	316635
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	266	2586	687770
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	53328	53328
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	2	38380	76760
5	Manifold check valve	Nos.	3	21210	63630
6	Discharge pressure switch	Nos.	1	18685	18685
7	Discharge nozzles	Nos.	4	5454	21816

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
8	Cylinder bracket	Nos.	6	1010	6060
9	Manifold for connecting 3 cylinders	Lot	1	21210	21210
10	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
	TOTAL FOR F.04				**3546366**
F.05	**FIRE PROTECTIVE APPARATUS**				
1	Set of protective clothing containing 2 Nos. Each following items ;				
1.1	Coat				
1.2	Trouser				
1.3	Gloves	Nos.	2	13125	26251
1.4	Anti-Flash Hood				
1.5	Helmets				
1.6	Boots				
1.7	FRP/stainless steel case for storage of Fire Suits				
2	Self- contained open circuit type compressed air Breathing apparatus set confirming to EN-137: 2006, standard complete with one spare cylinders				
2.1	Air cylinder with valve				
2.2	Back plate with body harness				
2.3	Face mask				
2.4	Pressure reducer, Pressure gauge & warning whistle	Nos.	2	122210	244420
2.5	Lung demand valve				
2.6	Wall mount cabinet for Breathing Apparatus				
2.7	Hoses				
2.8	Carrying case				
2.9	Spare air cylinder				
3	Water-jel fire blanket consisting scientifically formulated cooling gel and a carrier in size 96" * 72" n canister.	Nos.	1	8581	8581
4	Water-jel fire blanket consisting scientifically formulated cooling gel and a carrier in size 72" * 60" n canister.	Nos.	1	6865	6865

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
5	Snap light emergency evacuation system complete with two high intensity yellow klcolour cyalume lightsticsk (light proof, water proof, wind proof, non explosive, and non toxic) with temper proof pin on a all mounted unit.	Nos.	2	17162	34324
6	Emergency Combination EYE / FACE Wash push level and padel operated and Drench Shower - Pull Rod Operated.	Nos.	3	4545	13635
	TOTAL FOR F.05				**334075**
F.06	**TRANSFORMERS PROTECTION SYSTEM :**				
1	Design, Supply, Installation, Testing & Commissioning of fire protection system for transformers comprising of the following:				
1.1	45 Kg capacity CO_2, IHP Valve Assembly with automatic valve, push in connector for tube, 45 Kg CO_2 gas & mounting bracket.	Nos.	2	70700	141400
1.2	End of Line adapter	Nos.	2	3030	6060
1.3	Pressure Switch	Nos.	2	6565	13130
1.4	Linear pneumatic heat Detection Tube with all necessary fittings & supports.	RM	40	1212	48480
1.5	Master Control Unit for controlling each system, complete with pressure switches, buzzers and electronic hooters, including all necessary accessories + electrical wiring to make each entire system functional.	Nos.	2	12120	24240
1.6	Auto weight measuring unit for cylinders with automatic audio/visual alarm.	Nos.	2	11110	22220
1.7	Discharge Hose With Two nozzle Kit	Set	2	21245	42491
	TOTAL FOR F.06				**298021**
F.07	**VESDA SYSTEM FOR SER , TER & UPS ROOM:**				
1	Laser-Based Absolute Smoke Detection system with single inlet aspiration detector for Up to 250 m2 (2500 sq. ft.) coverage; Wide sensitivity range - 0.025%–20% obs/m; 3 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter; 3 Nos of inbuilt potential free relay outputs;supports linear pipe length of 25m or branched pipe up to 30m; supports 10 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; . Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA Laser Focus Detector with display - VLF 250 or equivalent (SER & TER)**	Nos.	2	222488	444976

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
2	Laser-Based Absolute Smoke Detection system with single inlet aspiration detector for Up to 500 m2 (5000 sq. ft.) coverage; Wide sensitivity range - 0.025%–20% obs/m; 3 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter; 3 Nos of inbuilt potential free relay outputs;supports linear pipe length of 50m or branched pipe up to 60m; supports 20 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; . Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA Laser Focus Detector with display & network card - VLF 500 or equivqlent (UPS ROOM)**	Nos.	1	295683	295683
3	Short wave length laser-Based Absolute Smoke Detection system with single pipe inlet, 1000 m2 coverage; Wide sensitivity range - 0.005%–20% obs/m ; 4 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter with memory; 7Nos of inbuilt potential free relay outputs;supports linear pipe length of 100m linear or branched pipe up to 130m per pipe; supports 30 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; TCP/IP, WiFi & VESDANet connectivity for central monitoring & monitoring of Andriod/iOS tablets/smartphones, facility to include analytics for notification of smoke from Diesel and PVC wire burning, notification for dust Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA E VEP A00-1P or equivalent**	Nos.	2	366857	733715
4	Short wave length laser-Based Absolute Smoke Detection system with 4 pipe inlets, 2000 m2 coverage; Wide sensitivity range - 0.005%–20% obs/m; 4 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter with memory; 7Nos of inbuilt potential free relay outputs;supports linear pipe length of 70m per pipe (total 280m) or branched pipe up to 130m per pipe; supports 40 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; TCP/IP, WiFi & VESDANet connectivity for central monitoring & monitoring of Andriod/iOS tablets/smartphones, facility to include analytics for notification of smoke from Diesel and PVC wire burning, notification for dust Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA E VEP A00-P or equivalent**	Nos.	1	450460	450460
5	Capilllary sampling point set for sampling from below false ceiling (room) **E700-TA+CSC+CT+SP+SPLR or equivalent**	Nos.	35	2788	97566

(Attachment No-6 to Addendum No-1) PART-B - DEPOT FIRE Detection & Suppression Systems					
Sl.No	**Item Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
6	Power Supply units for VLF detectors - Power supply unit operate on 230 volts AC mains input & provide 24 to 30 volt DC output for powering up the detector, support battery backup in case of AC mains failure & have built in charging circuit for batterys. **VESDA Model - VPS 220E or equivalent**	Nos.	3	13736	41208
7	Power Supply units for VEU detectors - Power supply unit operate on 230 volts AC mains input & provide 24 to 30 volt DC output for powering up the detector, support battery backup in case of AC mains failure & have built in charging circuit for batterys. Power supplies to be mounted on top of the VEU detectors as StaX units **VESDA Model - VPS 250 STX or equivalent**	Nos.	3	13736	41208
8	Sampling Pipe - Smooth bore UPVC or CPVC or ABS Pipe 25 mm Outer Dia & 19 to 21mm Inner Dia with all required bends joints & accesorys (approx qty of pipe)	RM	600	187	112110
	NOTE-Stand alone VESDA detectors proposed. Necessary hardware, cables required for integration of VESDA with fire alarm panel & Sounders need to be considered seperately				
	BOQ proposed is for covering all the voids and dedicated return air sampling is not considered				
	TOTAL FOR F.07				**2216925**
	TOTAL				**36487332**

(Attachment No-6 to Addendum No-1) PART-B - BMS BOQ - Depot					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
A	**BUILDING MANAGEMENT SYSTEM (BMS)**				
1	**Workstation in Depot Control Center (Maintenance Workshop & Central Store)**				
1.1	BMS Workstation shall comprise of the following minimum hardware: Intel Dual Core 3.2 GHz processor, 4 GB of RAM, Dual Screen 22" LED Color Display, 108 Keys - Keyboard, Optical Scrolling Mouse and Pad, 500 GB HDD 2 SATA Hard Disk Drive DVRCombo Drive, Built in dual gigabit port RAID controller, Graphics Card – Nvidia Quadro K6000 graphics or equivalent for High Quality BMS Graphics, Removable storage device (DVD - Read/Write), Minimum 8 X Speed. 2 Nos. USB 2.0 port, 1 Centronic parallel port Minimum 4 USB port, 2parallel Port, 2 Serial Port, Dual LAN Card, License copy of MS office & antivirus software and with all the required software SQL server Fully Redundant Power Supply & Fan Unit	No	1	156680	156680
2	**BMS Equipment & Local/Distributed IO's**				
2.1	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (PLC) - UL LISTED** SITC of Programmable and Application specific 32 bit, Supplyig, Installing, Testing & Commisioning of Programmable Logic Controllers with following specifications 1) Two identically- configured PLC processors are connected in a "Hot Standby" arrangement as "Master" and "Standby" so that when a component of the Master PLC fails, the standby PLC will take over automatically without interrupting the plant operation. 2) 32 bit CPU module with Ethernet Port for Programming / SCADA applications 3) Program Execution watching 4) Built-in hardware real-time clock 5) Semi conductor memory 6) Input supply 240V 7) Power consumption not more than 5kVA 8) CPU Processor module with Ethernet Port for Programming / SCADA applications The PLCs will be able to continuously operate under the following environment conditions a) Operating temperature: 0 to 40 deg. C b) Relative humidity: upto 95% All the PLCs and allied equipments shall be supplied, installed and commisioned with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification- with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification-BMS Systems. The CPU shall have the following key features - a) Industrial type and 2 identical CPU's b) RS 485 port c) Separate Hard disk (Internal Memory) for individual CPU's All PLC Controller input modules served equipment from outside are protected against voltage transients. All input/output modules are galvanically separated from CPU & internal bus. It is protected against short circuit and it is connected via separate terminal strip. PLCs shall be designed by taking 30% of spares in I/O's signals with Mounting cabinet. The PLC shall be designed to handle the IOs in accordance with the IO signals given below.	LOT	1	12095976	12095976

(Attachment No-6 to Addendum No-1) PART-B - BMS BOQ - Depot					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2.2	The same shall be consdered as a cumulative no of IOs as per the RIOs detailed below PLC for Station - Supply, Testing and Commissioning of Redundant Remote Input Output modules including IO racks compatible for communication protocols like (Modbus, Profibus, Ethernet, TCP-IP etc.,) with PLC's or Operating System. It shall be of communicating all station I/O's with the LSC. It should be supplied with wheather proof tight enclosure and shall comply to intrinsically safe if used in Hazardous area. Shall be of IP 55 and RIO cubicle shall be mounted on the base frame made of galvanised sheet channel with a minimum height of 100mm. The RIO's will be able to continuously operate under the following environment conditions. a) Operating Temperature: 0 to 40 deg. C b) Relative Humidity: upto 95% All the RIOs, allied equipments including interconnections shall be supplied, installed, tested and commisioned with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification - BMS Systems, Analogue Input, Analogue Output, Digital Input, Digital Output, Soft IO, etc. shall accomodate complete integration upto 1000 points				
3	**BMS CLIENT SOFTWARE LICENSE & CD.**				
3.1	BMS Client License & CD.Software shall be cable of interfacing with BMS Server Software and complete with Extensive System Graphic User Interface designed to suit the project as approved by Client / Consultants.	Set	1	167266	167266
4	**SYSTEM INTEGRATION UNITS FOR 3RD PARTY SYSTEM SOFTWARE INTEGRATION - UL listed Controllers**				
4.1	SITC of System Integration unit consisting of microprocessor based controller units as required to communicate between the Network Controller & the individual 3rd party microprocessor system controllers like Chillers, DGs, VFDs, VAV terminal units, UPS, Multifunction Digital Electronic Meters, Fire Detection Systems etc. as per distribution given below :	Set	1	197131	197131
5	**PORTABLE MAINTENANCE TERMINAL (LAPTOP).**				
	Supply, Installation, Testing and Commissioning of notebook PC. With minimum 14inch LED display screen, with 1920 x 1080 pixels, the notebook PC shall have Intel i7 or latest , 3.2GHz CPU complete with accessories as given below 500GB hard disk drive External Hard Disk Drive 8 GB RAM Removable Storage Device (CD / DVD) read and write 1 No RS-232 serial port, 3 no's USB Port. 101 Keys - Keyboard All other miscellaneous components to meet highest specifications.	No	1	188303	188303
6	**LASER PRINTER**				

(Attachment No-6 to Addendum No-1) PART-B - BMS BOQ - Depot					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
6.1	A hard-copy multi-color graphics Laser Printer shall be provided for recording graphic displays and associated dynamic data. Printer shall meet minimum requirements as follows: Print speed – Black: up to 20 ppm; color: up to 4 ppm First page out – 18 seconds black, 29 seconds color Resolution- 600 by 600 dpi Hi-Speed USB 2.0, IEEE 1284-B compliant parallel port Languages – PCL 6 and Postscript level 3 emulation with automatic language switching Font capabilities – 80 TrueType TM internal scalable PCL 6 fonts; 80 TrueType internal scalable HP postscript fonts	No	1	116549	116549
7	**SENSORS AND FIELD DEVICES**				
7.1	Supplying, Installing, Testing and Commissioning of the following sensors / transducers / transmitters				
a	Temperature Sensor (To sense the temaparature of Air- inside room)	Nos	35	6061	212135
	a) Type - Standard platinum 100 ohms element.				
	b) Accuracy - (+/- 0.2 degree C at Range of 0 to 50 degree C)				
b	Temperature Sensor (To sense the temaparature of Air- inside Duct)	Nos	35	6061	212135
	a) Type - Standard platinum 100 ohms element.				
	b) Accuracy - (+/- 0.2 degree C at Range of 0 to 50 degree C)				
c	Temperature Sensor (To sense the temaparature of Water)	Nos	17	6804	115674
	a) Type - Standard platinum 100 ohms element.				
	b) Accuracy - (+/- 0.2 degree C at Range of 0 to 50 degree C)				
7.2	Humidity sensor	Nos	6	11221	67327
7.3	Temparature & Humidity Sensor (T/Rh) (inside rooms)	Nos	6	17399	104396
7.4	Differential Pressure Switch				
a	Differential Pressure Switch (To sense the filter pressure drop, Flow status of fan - Air type)	Nos	20	2375	47490
	a) Type - bourdon tube, bellows or diaphragm				
	b) Rating - 220 volts, 10 amp AC or 24 volts DC.				
b	Differential Pressure Switch (Water type)	Nos	10	7777	77770
	a) Type - bourdon tube, bellows or diaphragm				
	b) Rating - 220 volts, 10 amp AC or 24 volts DC.				
c	Differential Pressure Sensor (To sense the pressure difference across AHUs duct - Air type)	Nos	12	6199	74393
d	Differential Pressure Sensor (To sense the pressure difference across pumps/chillers suction & dischagre - water type)	Nos	3	29540	88621
7.5	Level Transmitter	Nos	7	30080	210559
7.6	Flow Meter (for Chilled water application)	Nos	3	449402	1348205
7.7	Level Switch (To monitor the water level inside Sump/Tank/chabers)	Nos	8	3558	28466
7	**WIRING AND CONDUITING**				
	Supply, Installation, testing and commissioning of following control cables for Analogue and Digital signals laid in GI conduit of 2mm thickness and 20mm dia with supports at every 1.5 meter for vertical runs and 2.5 meter for horizontal runs.				
	2 Core X 1.0 Sq. mm copper conductor, aluminium shielded, FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided.	Mtrs	6500	43	282295

(Attachment No-6 to Addendum No-1) PART-B - BMS BOQ - Depot					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	4 Core X 0.5 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	12920	110	1422363
	6 Core X 1.0 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	3500	122	427735
	12 Core X 1.0 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	5500	209	1149885
	Flexible PVC Flexible conduit for termination in the PLC Panels	Mtrs	7500	96	719625
					19510979

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
B4	**AIR COMPRESSOR & EOT CRANE**				
	Sub Section - 1 - GENERAL				
1.1	The BOQ specified below include the latest relevent standards, specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer's representative may opt.				
1.2	The description as mentioned in BOQ, specifications, special conditions, GCC drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.				
1.3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.				
1.4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.				
1.5	Contractor's shall quote resonably rates against each item of BOQ (both in word and figure)				
	Sub Section - 2 -Maintenance Inspsection Workshop and Central Store				

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2.1	Designing, Supply, installation ,testing and commissioning of air compressor capacity 170 CFM at 10 bar with 30 KW Electrical motor 3 Phase 440 Volts complete with all accessories along with Electrical Control panel, necessary wiring , earthing,reservoir tank of 1500 litres capacity with apropriate inlet and outlet flanges designed for full rated capacity of 2 compressors etc. complete in all respects and as per technical specifications. **BMS Compatibility** All the compressors / system shall be design such that it should be compatible with BMS for compressor operation monitoring and it should be with open software protocol for easy compatibility with other software. **The price shall also include one set of spares and tools mentioned in the specification.**	**Nos**	**2**	1455373	2910747
2.2	Providing MS pipes conforming to IS 1239 (Class C) complete with all fittings such as elbows, sockets, tees, unions, reducers, flanges,clamps and plugs etc with threading, jointing and making connections including cutting hole in wall/floor/slab and making good the same with cement concrete 1:2:4 complete in all respect as per specifications including painting pipe and fittings with two or more coat of synthetic enamel paint of approved quality as per pipe colour over a coat of red oxide primer outside with 1 coat of primer and 2 coats of enamel paint,complete.				
a)	100 mm dia nominal bore	RM	200	2769	553722
b)	65 mm dia nominal bore	RM	1500	1655	2483085
c)	25 mm dia nominal bore	RM	600	625	375296
d)	20 mm dia nominal bore	RM	150	454	68160

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
e)	15 mm dia nominal bore	RM	100	346	34552
2.3	Providing M.S. structural work, fabricated from standard sections eg. M.S. rods, angles channels including cutting to size, drilling holes, fixing fastener /insert plates in RCC structural members as directed by the Engineer-in-Charge including cutting and making good the walls and floors (for supports,clamps,M.S. ladders,gratings etc.)	Kg	1600	160	255974
2.4	Providing gunmetal ball valve with SS ball & teflon seats and seals inside spindle type tested to 500 psi, complete.				
a)	25 mm dia nominal bore	Nos	100	6910	691042
b)	20 mm dia nominal bore	Nos	8	4972	39774
c)	15 mm dia nominal bore	Nos	50	4331	216534
2.5	Wafer Type, Cast Steel, Non Return Valves, Suitable for ASA 150 flanges,.				
a)	Size 100 mm nominal bore	Nos	4	54689	218756
b)	Size 65 mm nominal bore	Nos	7	37236	260654
2.6	Providing cast iron body PN 16, IS: 210 FG 220 and double flange simple operation type butterfly valve conforming to IS: 13095 with SS304 disc and shaft nitnile rubber replaceable seat of the following size complete with bolts, nuts, washers and rubber isertions as per specification.				
a)	100 mm dia noiminal bore	Nos	5	15578	77892
b)	65 mm dia nominal bore	Nos	5	11287	56433

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2.7	Pressure Gauges, 150 mm Dial, complete with mounting nipple and isolation valve. Range 0 - 15 Kg/Cm Sq.	Nos	30	17447	523414
2.8	Auto Drain Assembly, with Solenoid Valve and Timer. Timer should be adjustable between 5 Mins to 120 Mins. Size 15 mm NB.	Nos	30	43471	1304136
2.9	Providing Filter regulator 1/2" at every droplet after the ball valve suitable for 10 bar pressure.	Nos	130	19954	2593963
Total -1					**12664135**
	Sub Section - 3 - Compressor for UFWL/ Heavy Washing Shed				
3.1	Designing, Supplying, Installing, testing and commissioning of air compressor capacity 55 CFM at 10 baar with 11 KW Electrical motor 3 Phase 440 Volts complete with all accessories along with Electrical control panel, necessary wiring, earthing ,reservoir tank of 800 litres capacity with apropriate inlet and outlet flanges designed for full rated capacity of 2 compressors etc. complete in all respects and as per technical specifications. **BMS Compatibility** All the compressors / system shall be design such that it should be compatible with BMS for compressor operation monitoring and it should be with open software protocol for easy compatibility with other software. **The price shall also include one set of spares and tools mentioned in the specification.**	Nos	2	623754	1247509

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.2	Providing and fixing MS pipes conforming to IS 1239 (Class C) complete with all fittings such as elbows, sockets, fees, unions, reducers, flanges,clamps and plugs etc with threading, jointing and making connections including cutting hole in wall/floor/slab and making good the same with cement concrete 1:2:4 complete in all respect as per specifications including painting pipe and fittings with two or more coat of synthetic enamel paint of approved quality as per pipe colour over a coat of red oxide primer outside with 1 coat of primer and 2 coats of enamel paint, complete.				
a)	65 mm dia nominal bore	RM	100	1655	165539
b)	25 mm dia nominal bore	RM	100	625	62549
c)	15 mm dia nominal bore	RM	50	346	17276
3.3	Providing and fixing M.S. structural work, fabricate from standard sections eg. M.S. rods, angles channels including cutting to size, drilling holes, fixing fastenera/insert plates in RCC structural members as directed by the Engineer-in-Charge including cutting and making good the walls and floors (for supports, clamps, M.S. ladders, gratings etc.)	Kg	600	160	95990
3.4	Providing and fixing gunmetal ball value with SS ball & teflon seats and seals inside spindle type tested to 500 psi, complete.				
a)	65 mm dia nominal bore	Nos	5	7539	37693
b)	25 mm dia nominal bore	Nos	25	4972	124293
c)	15 mm dia nominal bore	Nos	15	4331	64960

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.5	Wafer Type, Cast Steel, Non Return Valves, Suitable for ASA 150 flanges,.				
a)	Size 65 mm nominal bore	Nos	3	37236	111709
3.6	Pressure Gauges, 150 mm Dial, complete with mounting nipple and isolation valve. Range 0 - 15 Kg/Cm Sq.	Nos	8	17447	139577
3.7	Auto Drain Assembly, with Solenoid Valve and Timer. Timer should be adjustable between 5 Mins to 120 Mins. Size 15 mm NB.	Nos	8	43471	347770
3.8	Providing and fixing Filter regulator 1/2" at every droplet after the ball valve suitable for 10 bar pressure.	Nos	50	19954	997678
Total -2					**3412543**
	Sub Section - 4 - Compressor for Work Train Workshop shed				
4.1	Designing, Supplying, Installing, testing and commissioning of air compressor capacity 55 CFM at 10 bar with 11 KW Electrical motor 3 Phase 440 Volts complete with all accessories along with Electrical control panel, necessary wiring, earthingreservoir tank of 800 litres capacity with apropriate inlet and outlet flanges designed for full rated capacity of 2 compressors etc. complete in all respects and as per technical specifications. **The price shall also include one set of spares and tools mentioned in the specification.**	Nos	1	623754	623754

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4.2	Providing and fixing MS pipes conforming to IS 1239 (Class C) complete with all fittings such as elbows, sockets, fees, unions, reducers, flanges,clamps and plugs etc with threading, jointing and making connections including cutting hole in wall/floor/slab and making good the same with cement concrete 1:2:4 complete in all respect as per specifications including painting pipe and fittings with two or more coat of synthetic enamel paint of approved quality as per pipe colour over a coat of red oxide primer outside with 1 coat of primer and 2 coats of enamel paint, complete.				
a)	65 mm dia nominal bore	RM	100	1806	180588
b)	25 mm dia nominal bore	RM	200	682	136471
c)	15 mm dia nominal bore	RM	50	346	17276
4.3	Providing and fixing M.S. structural work, fabricate from standard sections eg. M.S. rods, angles channels including cutting to size, drilling holes, fixing fastenera/insert plates in RCC structural members as directed by the Engineer-in-Charge including cutting and making good the walls and floors (for supports, clamps, M.S. ladders, gratings etc.)	Kg	100	160	15998
4.4	Providing and fixing gunmetal ball value with SS ball & teflon seats and seals inside spindle type tested to 500 psi, complete.				
a)	65 mm dia nominal bore	Nos	6	7539	45232
b)	25 mm dia nominal bore	Nos	5	5424	27119

(Attachment No-6 to Addendum No-1) PART-B COMPRESSOR WITH ACCESSORIES & COMPRESSED AIR PIPING					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
c)	15 mm dia nominal bore	Nos	15	4331	64960
4.5	Pressure Gauges, 150 mm Dial, complete with mounting nipple and isolation valve. Range 0 - 15 Kg/Cm Sq.	Nos	8	17447	139577
4.6	Auto Drain Assembly, with Solenoid Valve and Timer. Timer should be adjustable between 5 Mins to 120 Mins. Size 15 mm NB.	Nos	5	43471	217356
4.7	Providing and fixing Filter regulator 1/2" at every droplet after the ball valve suitable for 10 bar pressure.	Nos	8	19954	159628
Total -3					**1627960**
GRAND TOTAL = (TOTAL -1 + TOTAL-2+ TOTAL-3)					**17704638**

(Attachment No-6 to Addendum No-1) PART-B Cost Estimation EOT Crane					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
B4-2	**Sub Section - 1 - GENERAL**				
1.1	The BOQ specified below include the latest relevent standards, specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer's representative may opt.				
1.2	The description as mentioned in BOQ, specifications, special conditions, GCC drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.				
1.3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.				
1.4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.				
1.5	Contractor's shall quote resonably rates against each item of BOQ (both in word and figure)				
B4-2	**Sub Section - 2-EOT CRANE**				
2.1	Design, manufacture, supply, installation, testing and commissioning of Electric Overhead Travelling Cranes with Gantry rail and Downshop leads to be installed in the Workshop bay, Inspection bay and other maintenance buildings. The location of cranes in the various buildings is shown in drawings complete as per below.				

(Attachment No-6 to Addendum No-1) PART-B Cost Estimation EOT Crane					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	**Heavy Lifting bay :15/5 Ton** The rate include Design, manufacture, supply, installation, testing and commissioning transportation of 15T/5T EOT Crane for span 30m and bay length 301 m with Main hoist motor along with accessories, Auxiliary hoist motor along with accessories, and long/cross travel motors along with accessories. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. 1)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	Nos	2	7289227	**14578453**
b)	**Heavy Lifting bay :5/2 Ton** The rate include Design, manufacture, supply, installation, testing and commissioning of 5T/2T EOT Crane for span 30 m, and bay length 301 m with Main hoist motor along with accessories, Auxiliary hoist motor along with accessories, and long/cross travel motors along with accessories. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. 1)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	Nos	2	4208945	**8417889**

(Attachment No-6 to Addendum No-1) PART-B Cost Estimation EOT Crane					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
c)	**Inspection Bay: 1.6 Ton** The rate include Design, manufacture, supply, installation, testing and commissioning of 1.6T EOT Crane for span 8 m, bay length 214 m with Main hoist motor along with accessories, and long/cross travel motors along with accessories. Crane will be provided on inspection bay with special girder system in the bay. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. (In single bay with individual operation control / pendent)	nos	2	2169559	**4339117**
d)	**Work Train Workshop :10 Ton** The rate include Design, manufacture, supply, installation, testing and commissioning of 10T EOT Crane for span 10 m, bay length 80 m with Main hoist motor along with accessories, and long/cross travel motors along with accessories. Crane will be provided on inspection bay with special girder system in the bay. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. 1)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	nos	1	8417889	**8417889**

(Attachment No-6 to Addendum No-1) PART-B Cost Estimation EOT Crane					
S.N.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
e)	**Under Floor Wheel Lathe :5 Ton** The rate include Design, manufacture, supply, installation, testing and commissioning of 5T EOT Crane for span 7 m, bay length 40 m with Main hoist motor along with accessories, and long/cross travel motors along with accessories. Cranes will also be controlled from pendent switch and radio remote control. All the wire ropes along with hook, rope drum and necessary safety devices etc. Necessary arrangement of 3-phase power supply for working the crane throughout the long travel length along with current collection system. The EOT crane shall be complete in all respects and as per technical specifications. 1)The price shall also include one set of spares and tools mentioned in the specification. 2) (In single bay with individual operation control / pendent)	nos	1	4208945	**4208945**
	TOTAL				**39962293**

(Attachment No-6 to Addendum No-1) PART-B BILL OF QUANTITIES (CIVIL - PLUMBING) - Aarey Depot					
Sr .No	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	PUMPS				
1	Supply, Installation, Testing and Commissioning of following Hydropneumatically operated pumping set (pressure switch operated fully automatic) with C.I. Body, bronze Impeller, stainless steel shaft and induction motor, vibration eleminating pads and accessories including pressure tank, pressure switches, automatic control panel etc.mounted on a common skid complete in all respect.				
	Type of pump : (Drinking Water Pump Depot)				
	Capacity : 150 lpm				
	Head : 30 m				
	Motor RPM : 2900				
	Type of pump : (Drinking Water Pump OCC pump room to Overhead tank)				
	Capacity : 150 lpm				
	Head : 30 m				
	Motor RPM : 2900				
	Each set consists of 2 pumps (1 Working + 1 Stand by). At any given time, only one pump need operate. Both the pumps must operate alternatively in service.	Set	2	499950	999900
2	Providing, fixing, testing & commissioning of approved make centrifugal pumps with mechanical shaft, seals & bearings lubricated by the pumped liquid. The main pump components are made of corrosion resistant stainless steel AISI – 316. The pumps are direct coupled totally enclosed, fan cooled, standard motor of adequate HP capable of giving a discharge of 300 LPM at total head of 50 MT approximate to work on a 3 phase,2900 RPM 25 cycles 380-440 volts with the same make of control panel etc. complete. (Make: KSB, Grundfoss , Wilo)				
(a)	Transfer pumps (Pump room to Auto coach washing plant) (1W+1S)	SET	1	144430	144430
	Pump capacity - 300 lpm				
	Head - 50 m				
	RPM - 2900				
3	Providing, fixing, testing & commissioning of approved make centrifugal pumps with mechanical shaft, seals & bearings lubricated by				
(a)	Transfer pumps (Pump room to Emergency repair / Inspection Bay) (1W+1S)	SET	1	122210	122210
	Pump capacity - 250 lpm				
	Head - 50 m				
	RPM - 2900				

(Attachment No-6 to Addendum No-1) PART-B BILL OF QUANTITIES (CIVIL - PLUMBING) - Aarey Depot					
Sr .No	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
4	Providing, fixing, testing & commissioning of approved make centrifugal pumps with mechanical shaft, seals & bearings lubricated by the pumped liquid. The main pump components are made of corrosion resistant stainless steel AISI – 316. The pumps are direct coupled totally enclosed, fan cooled, standard motor of adequate HP capable of giving a discharge of 350 LPM at total head of 35 MT approximate to work on a 3 phase,2900 RPM 25 cycles 380-440 volts with the same make of control panel etc. complete. (Make: KSB, Grundfoss , Wilo)				
(a)	Filter feed pumps to WTP (1W+1S)	SET	1	177760	177760
	Pump capacity - 350 lpm				
	Head - 35 m				
	RPM - 2900				
5	Providing, fixing, testing & commissioning of approved make centrifugal pumps with mechanical shaft, seals & bearings lubricated by the pumped liquid. The main pump components are made of corrosion resistant stainless steel AISI – 316. The pumps are direct coupled totally enclosed, fan cooled, standard motor of adequate HP capable of giving a discharge of 250 LPM at total head of 50 MT approximate to work on a 3 phase,2900 RPM 25 cycles 380-440 volts with the same make of control panel etc. complete. (Make: KSB, Grundfoss , Wilo)				
(a)	Main STP Outlet Pump for all buildings (1W+1S)	SET	1	122210	122210
	Pump capacity - 250 lpm				
	Head - 50 m				
	RPM - 2900				
(b)	Irrigation Pumps from ETP/STP pump room (1W+1S)	SET	1	122210	122210
	Pump capacity - 250 lpm				
	Head - 50 m				
	RPM - 2900				
6	Providing, fixing and commissioning non clog type mono block submersible drainage pumps suitable for handling solids of 12 mm size with totally water and dust proof motor as specified complete with motor control panel and float switch, inclusive of all terminations and earthing required all complete as per specifications.(Make: KSB, Grundfoss , Wilo)				
(a)	Ancillary Sump Pump Capacity 150 lpm & Head 15 m (1W+1S) (Location : Depot)	SET	1	66660	66660
(b)	Ancillary Sump Pump Capacity 150 lpm & Head 15 m (1W+1S) (Location : OCC)	SET	1	66660	66660
(c)	Capacity 120 lpm & Head 15 m (Location : Lift pit)	EACH	1	27775	27775

(Attachment No-6 to Addendum No-1) PART-B BILL OF QUANTITIES (CIVIL - PLUMBING) - Aarey Depot					
Sr .No	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
7	Providing and fixing Transistorised liquid level controllers with low voltage relays and seamless steel probes and PVC shroud, including necessary wiring and conduiting from probes to display panel/motor control panels and to provide Audible Alarm for low level for each underground tank. (The cost of all required cabling from probes to motor control panels to be including in the rates).				
	For Domestic over head tank				
	To start pump at low water level in overhead tank and stop at high water level in overhead tank and low water level in underground tank.	Set	8	17515	140119
8	Providing and fixing single / multistage submersible tubewell pump suitable for 150mm bore with stainless steel casing. NORYL impeller, stainless steel shaft and built in non return valve coupled with submersible squirrel cage motors suitable for 145V +- 10% volts. 3 phase, 50 cycles AC supply.				
	Capacity 200 lpm				
	Head 50m, 5.0 HP	Each	2	36934	73869
9	50mm dia GI column pipe of jindal / TT Swastic make heavy class duly flanged	meter	150	677	101570
10	Providing and fixing 50mm Cable clip with nuts and bolts	No	40	74	2955
11	Providing and fixing 50mm dia supporting clamp with nuts and bolts	pair	2	862	1724
12	Providing & Fixing 3C - 6sqm Submersible cable	meter	300	246	73869
13	Providing and fixing steel wire rope 6 mm dia complete with wire rope clamps for safety of pump set.	meter	250	123	30777
14	Supplying and laying 1.1 KV grade aluminium conductor XLPE insulated and PVC sheathed armoured cables including 8 SWG GI earth wire on surface/Cable tray as required.	meter	30	616	18467
15	Providing and fixing dust and vermin proof motor control panel fabricated from 14 SWG MS sheet with stove enamelled paint and comprising of (For tube well pumps)				
a)	one feeder of 63 Ampere 4 pole ELCB.				
b)	One fully Automatic DOL starter with push button indicating lights.				
c)	One panel type volt meter 96 mm square with rotary selection switch for reading voltage between face and neutral or incoming feeder.				
d)	Three LED phase indicating light on the incoming main.				
e)	one Ampere meter 96 mm square panel type of appropriate range.				

(Attachment No-6 to Addendum No-1) PART-B BILL OF QUANTITIES (CIVIL - PLUMBING) - Aarey Depot					
Sr .No	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
f)	Etched plastic identification plates for all switch gears.				
h)	Space for liquid level controller.				
i)	All internal wiring should be colour coded from incoming main to switch gear, starters, meters, Indicating lights(Compartment light with min front area 1.50 sqm & 0.30 m deep)	No.	1	32010	32010
16	Providing, fixing, testing & commissioning of approved make centrifugal pumps with mechanical shaft, seals & bearings lubricated by the pumped liquid. The main pump components are made of corrosion resistant stainless steel AISI – 316. The pumps are direct coupled totally enclosed, fan cooled, standard motor of adequate HP capable of giving a discharge of 350 LPM at total head of 35 MT approximate to work on a 3 phase,2900 RPM 25 cycles 380-440 volts with the same make of control panel etc. complete. (Make: KSB, Grundfoss , Wilo)				
	Drain Pump for Drainage (1W+1S)	SET	1	177760	177760
	Pump capacity - 350 lpm				
	Head - 12 m				
	RPM - 2900				
	TOTAL OF PUMPS				**2502935**

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
1	**GENERAL**					
1.1	The BOQ specified below include the latest relevent standards (unless otherwise specified), specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval before use as the Employer.					
1.2	The description as mentioned in this BOQ including details as metntioned in GCC, SCC, Employers Requirement General specifications & Technical specificatios , Drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.					
1.3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.					
1.4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.					
1.5	Bus Bar Sizing calculations shall be submitted for approval of Employer or his representative.					
1.6	Contractor's shall quote reasonable rates against each item of BOQ.					
1.7	Steel structure/pipe shall be earthed.					
E.01	**M V SWITCHGEAR**					
1	**General**					
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from CRCA sheet steel of thickness not less than 2mm in general and load bearing members with 2.5mm and shall be folded and braced as necessary to provide a rigid support for all components with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 65 kA for ASS - I & ASS - II at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.					
a)	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.					
b)	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. The busbars shall be insulated with heat shrinkable sleaves. SMC/DMC (Double Moulding Compound) shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
c)	The panel shall have Copper busbars (phases, neutral & earth) with bar type feeder connections, spacers etc.and phases & neutral busbar shall be of 100% capacity and Earthing Busbar shall be 50% of Phase.					
d)	DELETED					
e)	All accessories & supporting structures such as channels, ISMC base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.					
f)	Each incomer and outgoing feeder shall be provided with multiple LED/neon type status indication lamps suitable for 230 V AC as approved.					
g)	Overall Space provision shall be @ 25% for future expansion					
h)	The makes of components and accessories shall, to the extent practically feasible, be same for panels and boards for uniformity, standardisation and replaceability and shall be applicable to all panels/ boards under the scope of work					
i)	Switchboard including interconnections, labeling, earthing,associated foundation / masonary work & erection etc. complete as required.					
j)	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity (Ics suitable for isolation conforming to latest IEC60947-2 duly marked on MCCB, at operating voltage (Ue) of 415 V, insulation voltage (Ui) 750 V and with trip free mechanism, handle indicating ON/OFF/tripped position. The breaking capacity as mentioned shall be Ics values.					
k)	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution as required and with front adjustable overload and short circuit releases and minimum electrical endurance of the order of 7000-8000 operation cycles (higher shall be preferred) for capacity of 100-250 amps..					
l)	All the MCCBs shall be provided with potential free contacts for connectivity to PLC for ON/OFF status and control, as required.					
m)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type, lower power loss approx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.					
n)	Panel/board design shall be compact and components / accessories of compact sizes are used to economise the room space available. Employer reserve the right to seek compact items in place of larger ones					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
o)	All incomer ACB's shall be provided with minimum 2 NO + 2 NC auxiliary contacts and all MCCBs shall be provided with 2 NO+ 2NC auxiliary contacts, and there should be provision to add min. 6 Auxiliary contacts.					
p)	All 4-pole ACBs shall have fully rated neutral pole. All 4-pole ACBs & MCCBs shall be provided earth fault protection.					
q)	The panel shall be fitted with fire trace tube system. Scheme of fire trace tube system shall be got approved by Engineer before proceeding with manufacturing and assembly.					
r)	All internal wiring to be FRLS					
s)	Various panels/boards as given below:					
1	**MAIN DISTRIBUTION BOARD (MDB) @ ASS-1**	No	1	17097351	17268324	17268324
A.	**INCOMER - TRANSFORMER - 1**					
	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories					
i.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 0.5 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB’s,					
iv	1- set Red/Green ON/OFF indicating lamps					
v	1- set of three phase (red, yellow, blue) indicating lamps					
vi	Amber healthy trip indicating lamps					
vii	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden & Class 5P10 for protection.					
viii	230 V AC shunt trip coil					
ix.	230 V, AC Motor wound spring closing mechanism					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
x	Terminals to receive copper sandwich bus duct					
xi	TNC Switch					
xii	Auto/local/remote selector switch key operated					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 3200 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 65 kA for 1 sec. at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	1 No. 1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps.					
ii	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iii	TNC Switch.					
iv	Auto/local/remote selector switch key operated.					
b)	3Nos. 800 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	3 nos. cast resin current transformers of 800/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iii	TNC Switch.					
iv	Auto/local/remote selector switch key operated.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
c)	1 nos. 400Amps, 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
d)	3 nos. 63Amps, 415V, Ics=65 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
D	**BUS COUPLER**					
a)	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage with adjustable setting with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	1- set of three phase (red, yellow, blue) indicating lamps					
iii	Amber healthy trip indicating lamps					
iv	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
v.	TNC Switch.					
vi.	Auto/local/remote selector switch key operated.					
E.	**INTERLOCKING**					
	Two incomers & one Bus Coupler shall be interlocked electrically & mechanically so that only two out of three shall be switched on at a time.					
F.	**INCOMER - TRANSFORMER - 2**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	3200 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (65 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting and with the following accessories :					
i.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv	1- set Red/Green ON/OFF indicating lamps					
v	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy trip indicating lamps.					
vii	3 nos. cast resin current transformers of 3200/5 ratio with 15 VA Burden and Class 5P10 for protection.					
viii	230 V AC shunt trip coil					
ix.	230 V, AC Motor wound spring closing mechanism					
x.	Terminals to receive copper sandwich bus duct					
xi.	TNC Switch					
xii	Auto/local/remote selector switch key operated					
G	**BUSBAR**					
	Electrolytic high conductivity Copper three phase and neutral busbars rated at 3200 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 65 kA at 415 V. The neutral busbar is to be of same size as phases.					
H	**OUTGOING**					
a)	1 No. 1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
iii	TNC Switch					
iv	Auto/local/remote selector switch key operated					
b)	2 Nos. 800 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 65 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	3 nos. cast resin current transformers of 800/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii	TNC Switch					
iv	Auto/local/remote selector switch key operated					
c)	2 nos. 630 Amp, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
d)	1 nos. 100 Amp,, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
e)	2 nos. 63 Amp,, 415V, Ics= 65 kA , TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
I	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
2	**EMERGENCY POWER PANEL(EPP) @ ASS-1**	No	1	8532709	8618036	8618036
A	**INCOMER - 1**					
	1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 50 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories					
i.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi.	Amber healthy/ trip indicating lamps					
vii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 5P10 for protection.					
viii.	230 V AC shunt trip coil					
ix.	230 V, AC Motor wound spring closing mechanism					
x.	Terminals to receive aluminium XLPE armoured cables					
xi.	TNC Switch.					
xii	Auto/Local/Remote Selector Switch Key operated					
B.	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1600 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to withstand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.					
C.	**OUTGOING**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
a)	2 Nos. 1250 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	3 nos. cast resin current transformers of 1250/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii	TNC Switch					
iv	Auto/local/remote selector switch key operated					
b)	1 nos. 100Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
c)	2 nos. 63 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
D.	**BUSCOUPLER**					
a)	1600 amps 50kA, Four pole electrically operated (motorised) fully draw out type air circuit breaker with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage with adjustable setting and with the following accessories :					
i.	1- set Red/Green ON/OFF indicating lamps.					
ii.	1- set of three phase (red, yellow, blue) indicating lamps.					
iii.	Amber healthy/ trip indicating lamps.					
iv.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
v.	TNC Switch.					
vi.	Auto/Local/Remote Selector Switch Key operated.					
E.	**INTERLOCKING**					
a)	Three incomers & one Bus Coupler shall be interlocked electrically & mechanically so that only two out of three shall be switched on at a time and only one out of three in DG case.					
F.	**INCOMER - 2**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 50 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories					
i.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi.	Amber healthy/ trip indicating lamps.					
vii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 5P10 for protection					
viii.	230 V AC shunt trip coil					
ix.	230 V, AC Motor wound spring closing mechanism					
x.	Terminals to receive aluminium XLPE armoured cables.					
xi.	TNC Switch.					
xii	Auto/Local/Remote Selector Switch Key operated					
G.	**INCOMER - 3 for DG Supply**					
	1600 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker (minimum 50 kA) with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting. and with the following accessories					
i.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi.	Amber healthy /trip indicating lamps.					
vii.	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden and Class 5P10 for protection					
viii.	230 V AC shunt trip coil					
ix.	230 V, AC Motor wound spring closing mechanism					
x.	Terminals to receive aluminium XLPE armoured cables.					
xi.	TNC Switch.					
xii	Auto/Local/Remote Selector Switch Key operated					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
H.	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1600 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to withstand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.					
I.	**OUTGOING**					
a)	1 No. 1250 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i	1- set Red/Green ON/OFF indicating lamps					
ii	3 nos. cast resin current transformers of 1250/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch					
iii	TNC Switch					
iv	Auto/local/remote selector switch key operated					
b)	2 nos. 630 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
c)	2 nos. 63 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.					
J	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3	**OCC BUILDING PANEL**					
3.1	**MDB-(OCC BUILDING)**	No	1	3023704	3053941	3053941

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
A	**INCOMER**					
a)	1 Nos. 800 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50KA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i.	1- set Red/Green ON/OFF indicating lamps					
ii.	3 nos. cast resin current transformers of 800/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
iii.	3 nos. cast resin current transformers of 800/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iv.	TNC Switch					
v.	Auto/Local/Remote Selector Switch Key operated					
vi.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
vii.	1- set of three phase (red, yellow, blue) indicating lamps.					
viii	Amber healthy /trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 800 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	3 nos. 400 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	3 nos.63 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
c)	4 nos. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
D	**METERING**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3.2	**SDB - POWER (OCC BUILDING)**	No	1	2995127	3025079	3025079
A	**INCOMER**					
	1 no. 400 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 400/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy/ trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	8 nos. 63 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	3 nos. 40 Amps, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
D	**METERING**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3.3	**VAC PANEL (OCC BUILDING)**	No	1	567357	573030	573030
A	**INCOMER**					
	1 no. 400 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 400/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy /trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	3 nos.160 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	5 nos. 40 Amps, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
D	**METERING**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3.4	**EPP (OCC BUILDING)**	No	1	3023704	3053941	3053941
A	**INCOMER -1 (FROM EPP BUS-1 & ASS-1)**					
a)	1 Nos. 1250 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50KA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i.	3 nos. cast resin current transformers of 1250/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
i.	1- set Red/Green ON/OFF indicating lamps					
ii.	3 nos. cast resin current transformers of 1250/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iii.	TNC Switch					
iv.	Auto/Local/Remote Selector Switch Key operated					
v.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
vi.	1- set of three phase (red, yellow, blue) indicating lamps.					
vii.	Amber healthy/ trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1250 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	4 nos.250 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 250/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	1 no.125 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
c)	5 nos. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
D	**BUSCOUPLER**					
	1 Nos. 1250 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i.	1- set Red/Green ON/OFF indicating lamps					
ii.	3 nos. cast resin current transformers of 1250/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iii.	TNC Switch					
iv.	Auto/Local/Remote Selector Switch Key operated					
v.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
vi.	1- set of three phase (red, yellow, blue) indicating lamps.					
vii.	Amber healthy/ trip indicating lamps.					
E	**INCOMER -2 (FROM EPP BUS-2 & ASS-1)**					
a)	1 Nos. 1250 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
i.	3 nos. cast resin current transformers of 1250/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	1- set Red/Green ON/OFF indicating lamps					
iii.	3 nos. cast resin current transformers of 1250/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
iv.	TNC Switch					
v.	Auto/Local/Remote Selector Switch Key operated					
vi.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
vii.	1- set of three phase (red, yellow, blue) indicating lamps.					
viii	Amber healthy/ trip indicating lamps.					
F	**BUSBAR**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 1250 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V. The neutral busbar is to be of same size as phases.					
G	**OUTGOING**					
a)	2 nos. 400 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	4 nos.250 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 250/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
c)	1 no.125 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
d)	1no. 40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
H	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3.5	**VAC PANEL (24x7) -(OCC BUILDINNG)**	SET	1	2995127	3025079	3025079
A	**INCOMER**					
	1 no. 400 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 400/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy/ trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	2 nos.250 Amp, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 250/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	14 nos. 40 Amps, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1-set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
D	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
3.6	**CHILLER PANEL - (OCC BUILDING) - (Panel Protection IP 65)**	SET	1	567357	573030	573030
A	**INCOMER -1 (FROM MAIN LT PANEL)**					
	1 no. 630 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy/ trip indicating lamps.					
B	**BUSBAR**					
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					
a)	3 nos.400 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	2 nos.40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
D	**BUS COUPLER**					
a)	1 no. 630 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
E	**INCOMER - 2 (FROM MAIN EMERGENCY PANEL)**					
	1 no. 630 Amps, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each complete with:-					
i.	3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with MFM with Voltage, Current Energy, Power Factor, KVAr, with communication port RS485 etc.					
ii.	3 nos. cast resin current transformers of 630/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
iii.	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.					
iv.	1- set Red/Green ON/OFF indicating lamps.					
v.	1- set of three phase (red, yellow, blue) indicating lamps.					
vi	Amber healthy/ trip indicating lamps.					
F	**BUSBAR**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
a)	Electrolytic high conductivity Copper three phase and neutral busbars rated at 630 A having a maximum current density as per specification with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50kA at 415 V. The neutral busbar is to be of same size as phases.					
G	**OUTGOING**					
a)	2 nos.400 Amp, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
b)	1 nos.63 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
c)	1 nos.40 Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.					
	The switchboard shall be complete with all inter connections, risers, internal wiring, labels etc complete as required.					
H	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
4.0	**FEEDER PILLAR - EXTERNAL LIGHTING**					
4.1	**FEEDER PILLAR - EXTERNAL LIGHTING - HIGH MAST (OUTDOOR TYPE IP-65 AS PER SPECIFICATIONS)**	SET	1	275718	278475	278475
A	**INCOMER**					
	1 no.63 A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases					
i	3 nos. cast resin current transformers of 63/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
ii	1 Nos. 0-24 Hrs double dial timer					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
iii	3 Nos. Auto / manual selector switch					
iv	6 Nos. 16 A TPN contactor with necessary NO& NC auxilliary contacts of 2 Sets.					
v	1 Job control flexible cabling from contactor to Timer					
B	**BUSBAR**					
	63 amps TPN Copper bus bars with heat shrinkable insulation sleeve.					
C	**OUTGOING**					
	16 amps TP+N MCBs 6 Nos					
D	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
4.2	**FEEDER PILLAR - EXTERNAL LIGHTING - STREET LIGHT (OUTDOOR TYPE IP-65 AS PER SPECIFICATIONS)**	SET	1	275718	278475	278475
A	**INCOMER**					
	1 no.40 A, 415V, Ics=35 kA, TP MCCB's with fixed neutral and with variable overcurrent and short circuit releases					
i	3 nos. cast resin current transformers of 40/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch					
ii	1 Nos. 0-24 Hrs double dial timer					
iii	3 Nos. Auto / manual selector switch					
iv	6 Nos. 10A TPN contactor with necessary NO& NC auxilliary contacts of Sets.					
v	1 Job control flexible cabling from contactor to Timer					
B	**BUSBAR**					
	40 amps TPN Copper bus bars with heat shrinkable insulation sleeve.					
C	**OUTGOING**					
	10 amps TP+N MCBs 6 Nos					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
D	**METERING**					
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, frequency & power factor conforming to specifications, latest IEC/ EMC and EMI standards/ criterion, with necessary Circuit MCB and supporting SCADA/BMS connectivity.					
5.0	**APFC PANEL**					
5.1	**350 KVAR APFC PANEL @ ASS-1**	SET	2	561997	567617	1135233
A	**INCOMER**					
	1 No. 800 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker50 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :					
	1- set Red/Green/Amber -ON/OFF/Alarm indicating lamps					
	1- set of three phase (red, yellow, blue) indicating lamps					
	1 Set of (0-500 volts) digital voltmeter with selector switch with MCB's, and one set of Digital Ammeter with 3 nos. 800/5 Amps, 15 VA, CT					
	TNC Switch.					
	Auto/local/remote selector switch key operated.					
	1 set of suitable rating of Current Transformer for incomer in main panel for APFCR relay					
	1- set of three phase (red, yellow, blue) indicating lamps.					
	1 Set - Automatic microprocessor based digital type power factor compensating relay (including power factor meter) in 10 steps for automatic cut off or add on capacitor units to keep the power factor at 0.95 with variation of loads. All associated auxiliary contactors/relays to be provided. Visual alarms, to display shortfall of P.T., automatic lockout of faulty Step, over temperature protrections. Auto manual selection and indications.					
B	**BUSBAR**					
	Electrolytic high conductivity Copper three phase and neutral busbars rated at 800 A having a maximum current density of 1.4 A per sq mm with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V.The neutral busbar is to be of same size as phases.					
C	**OUTGOING**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	Outgoing feeders consisting of following accessories.					
	1 nos. 250 amps , 35 kA TP MCCB with backup fuses of suitable capacity					
	4 nos. 160 amps , 35 kATP MCCB with backup fuses of suitable capacity					
	2 nos. 80 amps , 35 kATP MCCB with backup fuses of suitable capacity					
	1 nos. 250 amps 415 volts 50Hz heavy duty contactors					
	4 nos.160 amps 415 volts 50Hz heavy duty contactors					
	2 nos. 80 amps 415 volts 50Hz heavy duty contactors					
	11 nos “ON” /”OFF” push buttons and indicating lamps					
	1 nos. 250 amps rating TP terminal blocks					
	4 nos. 160 amps rating TP terminal blocks					
	2 nos. 80 amps rating TP terminal blocks					
	1 nos. 100 KVAR capacitor units in bank form					
	4 nos. 50 KVAR capacitor units in bank form					
	2 nos. 25 KVAR capacitor units in bank form					
	The switchboard shall be complete with all interbconnections, risers, internal wiring, labels etc complete as required.					
6	**Other Accessories**					
6.1	**Safety equipments in Aux. Substation/MDB room**	Set	1	195775	197732	197732
	Supply and fixing of the following safety equipments in Aux. Sub. Station /MDB room as per detailed descriptions given below and as per relevant IE rules & code of standard practice:-					
a)	High electro mat high voltage (11kV grade) mat of 6 MM thick and1000 mm wide and length on per LT panel requirement as per IS 15652-2006.					
b)	Laminated standard shock treatment charts in English & Hindi in ASS, DG room and Pump room.					
c)	Danger plate as per approved Style & sample written in English & Hindi for MV installations as required as per IE rules, IES and IS 2551 (latest) - 10 nos.					
d)	10 nos. First Aid Box Complete as approved by St. John ambulance or Indian Red Cross					
e)	Fire Buckets (Quantity will be in fire fighting BOQ)					
f)	Two Tool kit comprising 1 set of flat spanner (Taparia / Jalan), 1 set of box spanner, 1 no. Hacksaw frame with 10 No. blades, 1 no. large, medium, small screw drivers, 1 no. insulated plier, 1 no nose plier, 1 no. hand crimping tool upto 16 sqmm, 1 no. digital multimeter, 1 no. test lamp and 1 no. tester. Screw driver set for all types of screw heads also to be provided.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	TOTAL FOR E.01 (M V SWITCHGEAR)					**41080377**
E02	**DISTRIBUTION BOARDS**					
	General					
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3-phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bus bar assembly, phase segregating barriers, LED indicating lamps for incoming feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature range as per IS 694 FRPVC wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:					
a)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss approx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.					
b)	Residual current circuit breaker (RCCB) conforming to IS 12640 shall be provided with 30 mA sensitivity and electrically connected rated current capacity MCB for short circuit and over load protection as required					
c)	The LDBs may be required to accommodate Dimming Control equipment mountable on DIN rail. Contractor should refer to relevant specifications and drawings in this regard and submit his scheme for approval by Engineer in Charge.					
d)	All the contactors shall be provided with potential free contacts for remote monitoring and control.					
e)	Various distribution boards as given below:					
1	**Lighting distribution boards (LDB) Type-1**	No.	3	5592	5648	16945
	1 no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 4 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
2	**Lighting distribution boards (LDB) Type-2**	No.	4	16732	16899	67598

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 6 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
3	**Lighting distribution boards (LDB) Type-3**	No.	2	23620	23857	47713
	1no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 8 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
4	**Lighting distribution boards (LDB) Type-4**	No.	9	23924	24163	217468
	1 no. 25 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 12 nos 6 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
5	**Power distribution boards (PDB) Type-5**	No.	1	23620	23857	23857
	1 no. 32 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-25 amp DP 30 mA RCBO incoming and 4 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
6	**Power distribution boards (PDB) Type-6**	No.	7	23924	24163	169142
	1no. 40 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-40 amp DP 30 mA RCBO incoming and 4 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
7	**Power distribution boards (PDB) Type-7**	No.	1	23924	24163	24163

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 no. 40 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-40 amp DP 30 mA RCBO incoming and 6 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
8	**Power distribution boards (PDB) Type-8**	No.	7	28425	28709	200965
	1 no. 40 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-40 amp DP 30 mA RCBO incoming and 8 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
9	**Power distribution boards (PDB) Type-9**	No.	3	23924	24163	72489
	1 no. 63 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-63 amp DP 30 mA RCBO incoming and 8 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
10	**Power distribution boards (PDB) Type-10**	No.	5	23620	23857	119283
	1 no. 63 Amps, 4P, 10 kA, MCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 3 single phase banks each comprising of 1-63 amp DP 30 mA RCBO incoming and 12 nos 16 amps, SP, 10 kA, MCB with thermal magnetic protective releases out goings					
11	**VTPN Lighting distribution boards (LPDB) Type-11**	No.	1	23620	23857	23857
	1 no. 40Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 40 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 4 nos 25A TP MCB with thermal magnetic protective releases out goings with neutral link					
12	**VTPN Lighting distribution boards (LPDB) Type-12**	No.	1	28425	28709	28709

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	1 no. 63Amps, 4P, 25 kA, MCCB with thermal magnetic protective releases incoming with 4 pole 63 amp HDHC tinned copper bus bar with coloured heat shrinkable PVC sleeves and 8 nos 25A TP MCB with thermal magnetic protective releases out goings with neutral link					
	TOTAL FOR E.02 (DISTRIBUTION BOARDS)					**1012189**
E.03	**DISTRIBUTION CABLES**					
	General					
	The Cable and Cable Containment System specified herein, must confirm to technical Specifications, in addition to the description given in respective items of BOQ , whether explicity specified or not. In case of contradiction between specifications and description in BOQ, the most stringent of the condition will apply					
	"All the items / parts mentioned in relevent clauses of the technical specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded."					
	The cable runs shall be measured upto the outer end of the boxes without any allowances for over lap in joints. The rate shall include all the above mentioned material, labour, etc. for laying as required.					
	It may be noted that the Contractor will be required to carry out cable sizing based on actual cable lengths, as per working Drawings developed by him and after incorporating any changes in load requirements from the tendering stage. Optimization must be carried out during cable sizing to reduce the cable requirement and size . Further, Contractor must obtain Engineer's approval on the Cable Sizing Calculation.					
1	**FRLS Cable**					
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables on existing trays / walls/columns/ indoor including the cost of supply and fixing, crimping lugs, double compression and weather proof brass glands, Earthing lugs and shrouds, supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.					
	Note 1: All cables 25 sqmm and above are AL conductors unless specified otherwise.					
1.1	4 core 400 sq mm AL conductor cable	M	1,600	1398	1412	2259330
1.2	4 core 300 sq mm AL conductor cable	M	850	1098	1109	942461
1.3	4 core 240-sqmm AL conductor cable	M	1,550	1011	1021	1582564
1.4	4 core 185-sqmm AL conductor cable	M	100	735	742	74215
1.5	4 core 150-sqmm AL conductor cable	M	100	619	625	62549

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
1.6	4 core 120-sqmm AL conductor cable	M	300	572	578	173316
1.7	4 core 95 sq mm AL. Conductor cable	M	100	430	434	43440
1.8	4 core 70-sqmm AL conductor cable	M	100	364	368	36774
1.9	4 core 50 sq mm AL. Conductor cable	M	100	282	284	28442
1.10	4 core 35 sq mm AL Conductor cable	M	390	253	256	99657
1.11	4 core 25 sq mm AL Conductor cable	M	100	194	196	19554
1.12	4 core 16 sq mm CU Conductor cable	M	650	249	251	163206
1.13	4 core 10 sq mm CU Conductor cable	M	920	249	251	230999
1.14	4 core 6 sq mm CU conductor cable	M	2,120	323	327	692464
1.15	4 core 4 sq mm CU conductor cable	M	1,300	242	244	317746
1.16	3 core 4 sq mm CU conductor cable	M	1,000	263	266	265529
1.17	3 core 6 sq mm CU conductor cable	M	200	263	266	53106
1.18	3 core 2.5 sq mm CU conductor cable	M	300	141	142	42662
1.A	**Fire Survival Cables**					
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, **FIRE SURVIVAL CABLE, XLPE, Copper (CU)** conductor cables on existing trays / walls/columns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of supply and fixing, crimping lugs, double compression weather proof flame proof brass glands, Earthing lugs and shrouds, proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.					
	FIRE SURVIVAL cables are manufactured and tested in accordence with BS 7846, IS 7098 (Part-1), IEC 69331 and BS 6387 for required temperatures and duration based on the application and site conditions.					
i	4 core 240 sq mm fire survival Cu. conductor cable	M	1,200	1011	4482	5378400
ii	4 core 95 sq mm fire survival Cu. conductor cable	M	600	430	1799	1079400
iii	4 core 35 sq mm Cu. Conductor cable	M	200	253	781	156200
iv	4 core 10 sq mm Cu Conductor cable	M	200	249	387	77400
3	**Cable Trays & Racewayas**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	"Supply, fabrication & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below."					
	Note: Trays shall be supported adequately at minimum 1 m distance from the building structure / ceiling by means of galvanized (as specified) MS structural members secured to the structure by dash fasteners or by grouting. This support should be capable of withstanding the weight equivalent of 3m length of the cables that can be laid in the trays. At turns the support has to be double and at both ends of the bend.					
3.1	**Cable Trays - For E&M, Systemwide contractors**					
3.1.1	900 mm wide x 50 mm deep cable tray	M	100	2476	2501	250086
3.1.2	600 mm wide x 50 mm deep cable tray	M	1,000	1676	1693	1693164
3.1.3	300 mm wide x 50 mm deep cable tray	M	1,500	1065	1075	1613172
3.1.4	150 mm wide x 50mm deep cable tray	M	1,500	740	748	1121555
4	**Raceways in floor**					
	Supply, installation and testing of sheet steel raceways in floor, fabricated from 2.0 mm thick GI with minimum coating thickness 260 gm / sqm on both sides with removable cover plate complete with counter sunk cadmium plated brass screws, bends, tee-junctions, cross junction etc. rendered electrically continuous as approved and of following sizes. Necessary repair of floor shall be done after completion of work.					
4.1	200 mm wide & 50 mm deep Raceway	M	400	1422	1437	574609
4.2	150 mm wide & 50 mm deep Raceway	M	400	1142	1153	461287
5	**Ladder type cable trays**					
	Supply and fixing pre-galvanized factory fabricated GI ladder type cable trays, with radial bends, supports of the following sizes as per specifications.					
5.1	1000 mm wide Runners 25 x 100 x 25 x 3 mm Rungs 20 x 40 x 20 x 3 mm 250 mm Centre to Centre (C/C) Suspenders 50 x 50 x 5 mm angle 1500 mm Centre to Centre (C/C)	M	100	2429	2453	245309
5.2	750 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 50 x 50 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,250	1570	1585	1981746

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
5.3	600 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	2,000	1418	1432	2864158
5.4	450 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,500	1254	1267	1899810
5.5	300 mm wide Runners 20 x 75 x 20 x 2.5 mm Rungs 20 x 30 x 20 x 2.5 mm 250 mm Centre to Centre (C/C) Suspenders 40 x 40 x 4 mm angle 1800 mm Centre to Centre (C/C)	M	1,600	1065	1075	1720717
	TOTAL FOR E.03 (DISTRIBUTION CABLES)					**28205026**
E04	**CONDUIT WIRING**					
	General					
	Whether explicitly stated in the schedules below or not, the following must be complied with:-					
a	For supply and installation of conduits, flexible conduits and wiring, relevant clauses of Technical Specifications must be followed.					
b	"Wires supplied must conform to relevant clauses of Technical Specifications".					
c	Wiring accessories must conform Technical Specifications.					
d	In case of any contradiction between BOQ and Technical specifications, the most stringest condition of the two will apply.					
e	All final connections specially to vibrating equipments shall be made through steel flexible conduits.					
f	Recovery of conduit & fan boxes laid by Civil contractor will be made as per item no. 3 & 4.					
	"All the items / parts mentioned in relevant clauses of the Technical specifications and not specifically mentioned in BOQ shall be deemed to be included in the quoted rates, unless specifically excluded."					
1	**Light and Fan Wiring**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	Supply, all materials, storing, handling, fixing, laying wiring and testing for light, fan, exhaust fan and 6A Socket points etc starting from the point control box to the point by using 2.5 sq.mm 1100 volts grade FRPVC stranded copper conductor in concealed GI Stove enamelled 16 gauge conduit including 2mm thick GI boxes, fan regulator boxes, together with wiring accessories such as 6A moulded flush mounted modular switches, sockets in boxes of suitable sizes including circuit wiring with 2 x 2.5 sqmm 1100 volts grade FR PVC insulated stranded copper conductor along with one run of 2.5 sq.mm PVC insulated (green colour) stranded earth wire complete with earthing of fixtures, sockets and boxes. PVC bushes for conduits ends, chrome-plated brass screws, identification ferrules at either ends complete in all respects as per standard specifications. (Lights, fans and 6 amps socket outlets may be wired on a common circuit and circuit shall not have more than ten points of light, fans and 6 amps sockets or a load of 800 watts whichever is less).					
1.1	**Primary Light Points**					
1.1.1	**Switch Control**	Nos	517	3978	4017	2076983
	"Point wiring for switch controlled primary light points with 3 x 2.5 sq mm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted flush mounted 240 volt 6 amp control switch of approved quality & colour housed in zinc chromate passivated GI boxes with moulded cover plate and including cost of circuit wiring (from DB to first switch in the sub circuit) complete as per specifications and as required."					
1.1.2	**MCB Control with 3 x 2.5 sq. mm wire**	Nos	130	7582	7658	995556
	Point wiring for DB/MCB controlled primary light points with 3 x 2.5 sq mm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications Including cost of circuit wiring (From DB to first light point) complete as per specifications & as required (cost of MCB not included)					
1.1.3	**MCB Control with 3 x 4 sq.mm wire**	Nos	12	10916	11026	132307

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	"Point wiring for LED high/medium bay light fixtures MCB controlled primary light points with 3 x 4.0 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 32mm dia GI recessed and/or surface conduiting system including cost of providing saddles/ hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications Including cost of circuit wiring (From DB to first light point) complete as per specifications & as required (cost of MCB not included)."					
1.2	**Secondary Light Points**					
1.2.1	**Secondary Light Points with 3 x 2.5 sq. mm wires**	Nos	1,106	1086	1097	1212792
	"Point wiring for Secondary light points with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications and as required."					
1.2.2	**Secondary light points with 3 x 4 sq. mm wires.**	Nos	36	2912	2941	105869
	Secondary light points for high/medium bay light fixtures with 3 x 4.0 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 32mm dia MS recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting complete as per specifications and as required.					
1.30	**Point Wiring for Ceiling Fan Points**	Nos	40	2874	2903	116122
	"Point wiring for ceiling fan points with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hanger etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted flush mounted 240 volt 6 amp control switch and 240 volt 300 watt 5 Step electronic speed regulator of approved quality & colour housed in zinc chromate passivated GI boxes with moulded cover plate and with interconnections complete as per specifications and as required."					
1.4	**Point wiring for air circulator fan**	Nos	15	2456	2481	37213

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	Point wiring for air circulator fan with 3 x 4 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted 240 volt 16 Amps, 3 pin combined shuttered socket outlets along with 240 volt 16 Amps, control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate with interconnections complete & supply & fixing of the fan electronic speed regulator as provided with air circulator fan complete as required. (Swiutch & Socket at diffrent location)					
1.5	**Wiring for Socket Outlets**					
1.5.1	**Point wiring for 6 amp socket outlets**	Nos	298	1638	1654	492975
	Point wiring for 6 amp socket outlets with 3 x 2.5 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (50 strands of 0.25 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc as required and including the cost of cutting/making good chases in brick work and including the cost of Supply and fixing modular grid plate mounted 240 volt 6 amp 5 pin combined shuttered socket outlets alongwith 240 volt 6 amp control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate and interconnections and including the cost of loop earthing with 2.5 sqmm FR PVC insulated 1100 volt grade stranded copper conductor wires complete as per specifications and as required.					
1.6.2	**Point wiring for 16 Amps, socket outlets (1 outlet wired on 1 circuit)**	Nos	260	9563	9659	2511349
	"Point wiring for 16 Amps, socket outlets (1 outlet wired on 1 circuit) with 3 x 4 sqmm (P+N+E) FRLS PVC insulated 1100 volt grade flexible stranded (56 strands of 0.3 mm dia) copper conductor wires in IS embossed 25 mm dia GI recessed and/or surface conduiting system including cost of providing saddles/hangers etc for surface conduiting and/or cost of cutting and filling chases for recessed conduiting and including the cost of Supply and fixing modular grid plate mounted 240 volt 16 Amps, 3 pin combined shuttered socket outlets along with 240 volt 16 Amps, control switch of approved quality and colour housed in zinc chromate passivated GI boxes with moulded cover plate with interconnections complete as per specifications and as required.					
1.6.3	**Point wiring for 3 phase 63 amp socket outlets**	Nos	5	34872	35221	176105
	"Point wiring for 3 phase 63 amp socket outlets with 6 x 10.0 sqmm (3P+N+2E) FRLS PVC insulated 1100 volt grade flexible stranded (140 strands of 0.3 mm dia) copper conductor wires in IS embossed 50 mm dia GI recessed and/or surface conduiting system including the cost of providing saddles/hangers etc. as required and including the cost of cutting/ making good chases in brick work and including the cost of Supply and fixing industrial type 63 amp 10 kA "C" 4P MCB and 415 volt 63 amp industrial metal clad socket outlet in 16 SWG powder coated GI box with interconnections and including the cost of 415 volts 63 amp 4P plug top complete as per specifications and as required. "					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
2	**Modular Grid Plat Mounted Switch/es and Socket/s**					
	Supply & installation of following modular grid plate mounted switch/ (es) and socket/(s) etc. on a suitable size mild steel electrogalvanised switch boxes complete in single or combination on prorate basis complete with the connections, earthing and testing as per specifications and as required: (Note the grid plate and MS BOX shall be selected suitably as per the requirement to fix the switches and sockets.					
2.1	6/10A modular switches.	Nos	10	323	327	3266
2.2	6 Amp Universal socket with 6 amp modular switch.	Nos	10	485	490	4900
2.3	6/16 Amps, Universal socket with 16 Amps, modular switch.	Nos	10	570	575	5755
2.4	**20/25/32 Amps, 1-Phase Industrial Socket Outlet**	Nos	10	6724	6792	67915
	20/25/32A 1-Phase industrial socket outlet with 20/25/32A SP MCB in a GI enclosure with IP56 protection rating with all mounting & fixing accessories & terminations with separately lockable facility complete as required.					
2.5	**20/25/32 Amps, 3-Phase Industrial Socket Outlet**	Nos	10	9418	9512	95124
	20/25/32 Amps, 3-Phase industrial socket outlet with 20/25/32 Amps, TP MCB in a GI enclosure with IP 56 protection rating with all mounting & fixing accessories, terminations & Cable glands for cable entry with separately lockable facility complete as required.					
3	**GI Conduiting**					
	Supply and installation of GI conduiting complete with GI junction and pull boxes, GI fish wires as specified and as shown below.					
	Note: Conduiting has been assumed for Telephone/Data Points through out the Depot. Requirement shall be confirmed by S & T Contractor.					
3.1	25 mm inner dia 1.6 mm thick	M	4,000	169	171	684376
3.2	32 mm inner dia 1.6 mm thick	M	100	237	239	23887
3.3	50 mm inner dia 2.0 mm thick	M	100	418	422	42218
4	Providing and fixing circular/ Hexagonal cast iron or M.S. sheet box for ceiling fan clamp, of internal dia 140 mm, 73 mm height, top lid of 1.5 mm thick M.S. sheet with its top surface hacked for proper bonding, top lidshall be screwed into the cast iron/ M.S. sheet box by means of 3.3 mm dia round headed screws, one lock at the corners. Clamp shall be made of 12 mm dia M.S. bar bent to shape as per standard drawing.	each	300	157	159	47662

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	TOTAL FOR E.04 (CONDUIT WIRING)					**8832373**
E05	**INDOOR LIGHTING AND FANS**					
	General					
	"The Lighting System specified herein, must conform to the technical Specifications, in addition to the description given in respective items of BOQ, whether explicitly specified or not. In case of contradiction between specifications and description in BOQ, the most stringent of the condition will prevail."					
	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:-					
A)	**Luminaire minimum specifications and requirements**					
a.	Luminaires should operate at +/- 10% voltage fluctuation for continuous use to comply to IEC.					
b.	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of low smoke and zero halogen type. All luminaires shall be manufactured to relevant sections of IEC60598 or other approved international standards and the type tests for all luminaries shall be provided.					
c.	All internal wiring within the lighting fixtures shall be heat-resisting cables.					
1	**Indoor Light Fixture**					
1.1	Supply, installation, testing and commissioning of 34W LED Full Glow (similar to Philips model- RC380B G2 LED35S-6500 PSD OD WH or approved equivalent) mounting luminaire with mid flux LED using efficient optics enclosed in a metallic CRCA powder coated housing with with accessories					
a)	**Supply of above given items**	Nos	504	6345	6408	3229757
b)	**installation, testing, commissioning of above given items**	Nos	504	338	341	171903
1.2	Supply, installation, testing and commissioning of 16W LED Cirrus Mini (similar to Philips Model- SM518C LED16S 6500 PSU OD GR or approved equivalent), recess mounted Down type light fixture with accessories					
a)	**Supply of above given items**	Nos	236	4694	4741	1118790
b)	**installation, testing, commissioning of above given items**	Nos	236	247	249	58837
1.3	Supply, installation, testing and commissioning of 28W LED Line Light (similar to Philips model - SP310X LED 222 - 6500 PSU OD GR or approved equivalent) surface mounted type light fixture with accessories					
a)	**Supply of above given items**	Nos	612	2962	2991	1830581
b)	**installation, testing, commissioning of above given items**	Nos	612	163	164	100630

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
1.4	Supply, installation, testing and commissioning of 28W LED Cirrus Mini (similar to Philips model- SM518C LED16S 6500 PSU OD GR or approved equivalent), surface mounted LED tube type light fixture with accessories					
a)	**Supply of above given items**	Nos	145	4055	4095	593796
b)	**installation, testing, commissioning of above given items**	Nos	145	213	216	31252
1.5	Supply, Installation, Testing & commissioning of LED light fixture with accessories similar to Philips model No. Tempo LED BVP410 LED 107 CW HE NB FG S3 XT(1X50W) or approved equivalaent					
a)	**Supply of above given items**	Nos	6	11647	11763	70580
b)	**installation, testing, commissioning of above given items**	Nos	6	613	619	3715
1.6	Supply, Installation, Testing & commissioning of LED Light fixture with accessories similar to Philips model No.Endural LED Bulkhead WT202W LED6S NW PSU S2 PC or approved equivalent.					
a)	**Supply of above given items**	Nos	31	3439	3473	107663
b)	**installation, testing, commissioning of above given items**	Nos	31	182	183	5683
1.7	Supply, Installation, Testing & commissioning of 430W LED Decorative chandellar LED Light fixture with accessories					
a)	**Supply of above given items**	Nos	2	4694	4741	9481
b)	**installation, testing, commissioning of above given items**	Nos	2	247	249	499
1.8	Supply, Installation, Testing & commissioning of LED Light fixture with accessories similar to Philips Model No. 77180 (1X18W) or approved equivalent					
a)	**Supply of above given items**	Nos	18	4055	4095	73713
b)	**installation, testing, commissioning of above given items**	Nos	18	213	216	3880
1.9	Supply, Installation, Testing & commissioning of LED Light fixture with accessories similar to BEGA model No. 77639 (1X5W) or approved equivalaent					
a)	**Supply of above given items**	Nos	108	6897	6966	752325
b)	**installation, testing, commissioning of above given items**	Nos	108	363	367	39596
1.10	Supply, Installation, Testing & commissioning of LED Light fixture with accessories similar to BEGA model No. 88741 (1X70W) or approved equivalaent					
a)	**Supply of above given items**	Nos	48	3439	3473	166703
b)	**installation, testing, commissioning of above given items**	Nos	48	182	183	8799
1.11	Supply, Installation, Testing & commissioning of 250W LED Flood light fixtures with accessories for yard lighting (Highmast fittings) similar to Philips Model No.Tempo LED - BVP410 LED 242 CW HF NB FG S3 XT or approved equivalanet					
a)	**Supply of above given items**	Nos	36	3439	3473	125027

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
b)	**installation, testing, commissioning of above given items**	Nos	36	183	184	6639
1.12	Supply, Installation, Testing & commissioning of 40W LED light fixtures with accessories for street lighting similar to Philips model No.GreenLine - BRP409 LED CW 034 MR PCC S1 PSU GR or approved equivalent					
a)	**Supply of above given items**	Nos	72	6897	6966	501550
b)	**installation, testing, commissioning of above given items**	Nos	72	363	367	26397
2	**Fans**					
	Supply, installation, testing & commissioning of the following fans including fixing arrangement and with all accessories like down rods, 5 step electronic fan regulators, cover plates, cups as required for the following complete with necessary seamless pipe required for hanging of the fans etc.					
2.1	**Ceiling Fan 1200 mm Sweep**	Nos	40	1671	1688	67504
	Ceiling Fan 1200 mm sweep with out regulator but with all accessories as per IS: 374, 1979 with all amendments as applicable as required.					
2.2	**Air Circulator Fans 600 mm Sweep**	Nos	15	7721	7798	116972
	wall / column mounted industrial type heavy duty fan 600 mm dia sweep complete with all accessories required.					
	TOTAL FOR E.05 (INDOOR LIGHTING AND FANS)					**9222272**
E06	**HIGHMAST & STREET LIGHT POLES**					
	Highmast	Nos	3	527493	532768	1598303
	Supply, installation, testing and commissioning of 30 m high mast system with its accessories. Mast shaft shall be of Bajaj / Philips / Keselec / Thorn, hot dip galvanised and suitable for wind velocity as per IS 875. It shall also include accessories for high mast including head frame, steel wire rope, trailing cable, double drum winch, Galvanised Lantern carriage arrangement suitable for 12 luminaires & its control gear boxes and lightning arrestor. The mast shall have an External powertool installed inside the base compartment for its operation and including following					
	Foundation bolts manufactured from special steel along with nuts, washers, anchor plates and templates.					
	S.I.T.C. of suitable neon Aviation lights as required.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	Control panel housing with suitable TPN MCB incomer, one numbers single dial timer contactor circuit for the automatic control of luminaries.					
	Common power tool for the operation of the mast with single phase single speed motor along with reversing gear, stand, control push button and other accessories.					
	Earth Station of Pipe earthing (2Nos) as per IS:3043-1987 & IEEE:80-2000, including duplicate earth connection to the mast with 25x3 mm size GI Strip.					
	Street Light Poles	Nos	72	17229	17402	1252915
	9.0 meter hot dipped galvanised Octagonal with single & Double overhang arm & with foundation bolts, base plate complete with foundation, entry and exit pipes, control JB with connector generally as shown on drawings and as per specifications.					
	TOTAL FOR E.06 (Highmast & Street light pole)					**2851218**
E.07	**PROTECTIVE EARTHING SYSTEM**					
	General					
	Contractor has to check the value of soil resistivity before execution and contractor shall subject to submit detail earth mat calculations for approval to Engineer. After their final approval work shall subject to commenced.					
	Note:- Steel structure/pipe shall be Earth by suitable rating of earth strip/wire.					
1	**EARTHMAT**					
1.1	**50X6mm copper flat for Earth Mat @ ASS -1 Building**	M	500	609	615	307747
	Supply, laying, testing and commissioning of 50X6mm copper flat for earth mat (at 700 mm to 3000 mm deep as per approved drawing & calculations) as per specifications including lap (of not less than 150 mm) & cross weld joints and providing bitumin coat at every joint as required. Earthing risers from earth mat to be brought out as per approved drawings and specifications wherever required.					
1.2	**30 mm dia Copper Rod for Vertical Electrodes**	Nos	12	2032	2052	24624
	Supply, laying, testing and commissioning of 30 mm dia copper rod, laying of vertical earth electrodes 3 m deep from earth mat including weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
1.3	**Extra for Bituminous Coating and Hessian Tape Wrap**	M	400	35	36	14221
	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried earthing strips risers mentioned above in item 1.1 as per specifications and drawings as required.					
2	**MAINTENANCE FREE EARTHING**	Nos	50	6059	6119	305969
2.1	**Maintetance free earthing-**					
	Supply, installation and testing of copper bonded (25mmX 3Mtr)electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover					
3	**EARTHING STRIPS & CABLES**					
3.1	**Strips for Interconnecting the Earthing Stations, Panels, DBs etc**					
	Supply, Laying, fixing, testing and commissioning of following strips for interconnecting the earthing stations, panels, DBs, Cable trays, etc. of the following sizes in built up trenches /surface/wall/ground complete with holes & fixing, jointing/terminating accessories as per specifications as required. (Quantity shall be paid as per the actual measurement as executed) however direct measurement shall not exceed the quantity indicated in drawing approved by engineer.					
3.1.1	70 mm x 10 mm GI strip	M	1,500	633	639	958238
3.1.2	65 mm x 8 mm GI strip	M	500	402	406	202758
3.1.3	50 mm x 10 mm GI strip	M	1,000	495	500	499950
3.1.4	50 mm x 6 mm GI strip	M	2,000	273	276	551056
3.1.5	25 mm X 6 mm GI strip	M	2,000	145	147	293304
3.1.6	50 mm x 6 mm CU strip	M	1,500	609	615	922635
3.1.7	25 mm x 6 mm CU strip	M	1,500	81	82	123321
3.1.8	8 SWG Cu WIRE	M	2,000	45	46	91102
3.1.9	70Sqmm single core Copper cable for clean earthing	M	150	249	251	37663
	Note-1: In case of non availability of any of the sizes mentioned above, next higher size available in market shall be provided at the same rate.					
	Note-2: No additional payment will be made for providing Main Earth Terminals (made out of GI strips from within the above sizes). The METs will be required to be fixed on walls as required and will be provided with 12/16/20mm holes for connections of individual equipments earthing including the other system wide contractors.					
	TOTAL FOR E.07 (PROTECTIVE EARTHING SYSTEM)					**4332587**

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
E.08	**LIGHTNING PROTECTION**					
1	**Lightning Conductor Finials**	Nos	6	1075	1085	6513
	Supply and fixing Lightning Conductor Finials made of 25 mm dia 1mtr long copper tube having a single prong at the top with 85 mm dia 6 mm thick copper base plate, fixing accessories and clamping with down conductor as per specifications complete as required.					
2	**Stainless Steel horizontal & Vertical Conductor**					
	Supply, laying and fixing of the stainless stell horizontal & vertical conductor of following sizes on surface/wall/parapet/shaft complete with joints, bimetallic connectors, testing links & other fixing accessories and clamping/ connection with earth terminations as per specifications & drawing as required.					
2.1	25x6 mm thick SS Strip	M	500	94	149	74500
3	**Testing Joints**	M	40	846	854	34174
	Supply and fixing of the testing joints made of 50 mm x 6 mm thick SS strip 125 mm long with 4 Nos. SS bolts, nuts, check nuts and spring washers complete as required.					
4	**Maintetance free earthing-**	Nos	15	6665	6732	100973
	Supply, installation and testing of copper bonded (25mmX 3Mtr)electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover					
5	**Air Craft Warning Lights**	Nos	2	10122	10223	20447
	Supply, installation, testing & commissioning of air craft warning lights complete with non flickering type lights similar to GEC model ZH 752 or WIPRO model no. WAN 20001 or equivalent including lamps, mounting bracket, earthing, painting complete with accessories to automatically switch off lights. (Point wiring shall be done under subhead conduit wiring).					
	TOTAL FOR E.08 (LIGHTNING PROTECTION)					**236607**
E.09	**EXTERNAL PIPING SYSYTEM**					
4	**PIPES**					
4.1	**HDPE Pipe**					
	Supply and laying of following HDPE pipe NP4 grade under paved areas/track crossings including necessary excavation, honching and back filling complete as required as per IS:14333:1996 with all amendments applicable.					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
4.1.1	200 mm dia HDPE Pipe	M	100	1054	1064	106434
4.1.2	120 mm dia HDPE Pipe	M	300	529	534	160317
4.1.3	80 mm dia HDPE Pipe	M	600	331	334	200647
4.2	**Heavy/Medium Grade GI Pipes**					
	Supply and installation of following heavy duty grade GI pipes for cables crossing the rail tracks with all bendings complete as required including necessary excavation, honching and back filling as complete as required as per IS:3589 & IS 1239 with all amendments applicable,					
4.2.1	150 mm dia GI pipe	M	50	1960	1980	98990
4.2.2	100 mm dia GI pipe	M	100	1335	1349	134875
4.2.3	80 mm dia GI pipe	M	100	981	991	99101
4.2.4	40 mm dia GI pipe	M	50	540	546	27275
4.3	**RCC Hume Pipes**					
	Supply and installation of following RCC Hume pipes NP4 grade, for cables crossing the roads with all fitting accessories complete as required including necessary excavation, honching and back filling as compete as required as per IS:458: 2003 with all amendments applicable.					
4.3.1	450mm dia RCC Pipe	M	50	2603	2629	131431
4.3.2	250mm dia RCC Pipe	M	100	794	802	80214
4.3.3	150mm dia RCC Pipe	M	500	531	537	268307
	TOTAL FOR E.09 (EXTERNAL PIPING SYSYTEM)					**1307591**
E.10	**COMPACT SANDWICH TYPE BUS DUCT**					
1	**3200 amps Compact Sandwich Bus Duct**	M	30	360072	363673	10910176
	Supply installation, testing & commissioning of the following totally enclosed, dust and vermin proof Low impedance compact sandwich bus duct:					
	Ingress protection IP 55					
	Indoor mounts					
	14 SWG sheet steel clad					
	Electrolytic Grade Cupper(Cu.) bus bar					
	Operation at 415 Volt 3 phase 50 Hz system					
	Insulation voltage 1000 volts					
	Fault withstand 65 kA symmetrical for 1 second					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	The bus duct shall be complete with all required accessories like clamps, end covers, thrust pads, flexible connections end termination flange joint etc. as required and including wall mounting brackets and including the cost of expansion joints complete as per specifications, as required and as below and suitable for operation at 415 volt 3 phase 50 Hz system.					
	3200 amps 3P +100%N+50% Integral Earth including bends.					
	TOTAL FOR E.010 (COMPACT SANDWICH TYPE BUS DUCT)					**10910176**
E.11	**UNINTERRUPTED POWER SUPPLY SYSTEM**					
	Supply, Installation, Testing and Commissioning of **following rating online, UPS** system suitable for providing power supply to emergency lighting and Computerised Control panel load of approved make, suitable for incoming 415 volts, 3 phase +10 % - 20%, 50 Hz, supply and three phase output voltage, variation ± 1%, including transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annunciation,protection(including against input phase reversal), and menu run diagnostic module,associated cabling and connections/ terminations, erection including associated foundation/ masonorey or RCC work for mounting on base channels etc. complete as per specifications and as required.					
	The UPS shall be a true parallel redundant with bypass with Individual Battery Bank on each UPS for 30 Minuits (2X100% Redundancy on Battery Setup)					
11.1	2 X 60KVA UPS (PR System)	No	1	1280067	1292867	1292867
11.2	Supply, Installation, Testing and Commissioning of 2V SMF VRLA lead acid sealed maintenance free battery (Design Life - 10years) suitable for 30Minuits backup to the UPS set. Battery shall comply with relevant regulations & Battery racks shall b made of acid resistant material. (60KVA UPS)	Set	1	3487136	3522008	3522008
	TOTAL FOR E.11 (UNINTERRUPTED POWER SUPPLY SYSTEM)					**4814875**
E.12	**DG SET WITH PLC BASED AMF PANEL**					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
	Supplying, installation, testing & commissioning of Radiator Cooled type Diesel Generating Set comprising of multicylinder diesel oil engine with radiator, fly wheel, exhaust piping upto silencer, residential type silencer, electric starting equipments, batteries, battery charger, directly coupled to an alternator of suitable capacity at 0.8 P.F. 3 phase, 4 wire 50 Hz 415 volts, A.C supply complete with base plate antivibration mountings foundations for installation of D.G. Set,terminating arrangement for outgoing cables, control panel,controlling MCCB etc, complete of exhaust pipe installation with support arrangement as required as per specifications, Drawings and specified ambient conditions					
	DG Sets shall be suitable for Auto Start, Auto Stop and Auto Load Management.					
12.1	**1000 KVA D.G. SET WITH CANOPY (INCLUDING PLC BASED AMF PANEL**	Set	1	9127360	9218634	9218634
	Supply, erection, testing and commissioning of floor mounted totally enclosed sheet steel AMF Panel with PLC suitable for automatic operation of 1000 **k**VA DG set and equipped with automatic gas flooding using linear heat sensing tube type fire trace system or equivalent. The panel shall be suitable for 415 V, 3 phase, 4 wire system, **Copper bus bars** designation labels as per requirement, continuous earth bus, cable clamping supports, panel illuminating lamps, cable gland plates for incoming and outgoing feeders as per details below :	Set	1	2997797	3027775	3027775
(a)	**Switchgear** 1 nos. 1600 A, 50 kA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable					
(b)	1 No., 230V, AC operated integrated type Digital Multi function meter for measuring Frequency, Amperes ,Voltage, Energy & Power factor of appproved makes conforming to specifications, latest IEC/ EMC and EMI standards, with necessary Circuit MCBs and suitable size CTs for above two incomer metering supporting SCADA / BMS connectivity					
©	One set of ***"Battery charger"*** consisting of :					
(i)	Transformer/Rectifier					
(ii)	DC. Ammeter					
(iii)	DC. Voltmeter					
(iv)	Charging rate selector switch (OFF/Trickle/Boost.)					
(d)	One Mains supply Voltage monitor					
€	One set of DC Control relays incorporating engine Start/Stop, three attempts starting facility and failure to start lock out.					
(f)	One set of auxiliary relays for automatic closing and opening of the alternator contactor for automatic operation as required.					
(g)	6 nos. potential free contacts for BMS					

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**
(h)	One selector switch Auto/Manual/ Test					
(i)	One set of the following :					
(i)	One Selector switch for engine control OFF/ON					
(ii)	Four Push buttons, Start, Stop, Reset, Test.					
(iii)	Two Indicating lamps "Load on set" "Load on Mains".					
(iv)	Five Indication on annunciator for shutdown for "Low lube oil pressure", "High water Temperature", "overspeed", "low fuel" & "set fails to starts".					
(j)	One counter to indicate number of times set has operated.					
(k)	One **Hour meter** to indicate the number of hours set has operated					
(l)	The AMF panel shall include necessary internal wiring, control circuit fuses, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required					
(m)	Power Pack for the PLC backup of the DG set with all arrangement, including battary, Control Circuits, Internal wiring, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required					
12.2	**FUEL SYSTEM**	Lum	1	550000		
a	Supplying, installation, testing and commissioning of heavy duty Hand cranking oil pump with 3 mtr. Long flexible oil hose.	Nos	2	4509		
b	Supplying, installation, testing and commissioning of 990 Day Oil fuel steel tank of under mentioned capacities made out of 5 mm thick M.S. sheet with float valve and low level alarm arrangement including fuel oil piping up to the set valves etc. complete as required.	Nos	2	40193		
c	Supplying, installation, testing and commissioning of Suitable rating Fuel Oil pump including foundations, piping, valves, indications, safety devices etc. complete as required.(Crompton / GE / Kirloskar make)	Nos	2		555500	555500
d	MS C class 25mm fuel pipe	Mtrs	Lum			
e	Ball Valve 25mm	Nos	2			
	The Contractor scope of inspection and approval for getting the layout drawing, installation, license from Electrical Inspectorate local authority, explosive department,HERC for Campus complete as required for satisfatory function of the installation of above DG Sets					
	The contractor shall submit back-pressure calculations in support of exhaust pipe size for each DG Set.					
	TOTAL FOR E.12 (DG SET)					**12801909**

(Attachment No-6 to Addendum No-1) PART-C - 'SCHEDULE OF QUANTITIES -STATION - LT						
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (INR)**	**Unit Price (INR)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**5**	**6**

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
H.01	**Air cooled CHILLERS, , PUMPS, AHU's & FCU's AND PRECISION A/C**				
1A	**Air cooled Chillers**				
	Supply, installation, testing and commissioning of Air cooled chillers with VFD (AHRI / EURO VENT Certified) as mentioned operating conditions in Technical specification with Screw compressor, driven by suitable kW.with Environmental friendly refrigerant R134a/ R410A and oil, induction motor complete with Air cooled shell and tube condenser with Anti Fouling Device on inlet connection, insulated shell and tube chiller, refrigerant piping, Refrigerant and oil (First Charge), Microprocessor based control panel and accessories etc. as per specifications and data sheet. Motor shall be suitable for 415 volts + 10% , 50 Hz + 3%, three phase AC supply.				
	Total 1A Capacity = 150TR on specified design conditions	Nos.	3	6687228	20061684
1B	**Chiller Plant Manager**				
	Design, Supply, installation, testing and commissioning of 32 bit, UL Listed BACnet (BTL certified) Supervisory Controller for management level interface in MS Enclosuer powder coated SIEMENS grey for SUPERVISORY CONTROLLER, IO CARDS (with accessories like Transformer, MCB, internal wiring and Relays with bases) (A) The Network supervisory Controller shall have imbedded graphic capability for generating web based user graphics and support Multi user with simultaneous minimum 4 user login facility (B) Unlimited user without additional licence (C) Shall be browsed by Microsoft Internet Exlporer and Netscape Navigator(D) BTL certified (E) Web engine should be 32bit configuration (F) Should have inbuilt display and keys to operate in absence of PC (G) Should have inbuilt IO points (H)Functionally able to act as a DDC controller also apart from Supervisory controller function (I) Web engine should support ASHRAE standard BACnet MS/TP protocol , Proprietry Protocol shall not be accepted((J) Web engine should support integration of third party protocol (eg MODbus-RTU) seemlessly without adding additional hardware (K) Web engine should support DHCP function for IP addressing.				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	DDC / IOM CONTROLLERS for equipment control	Set	1	2665958	2665958
	SITC of Programmable and Application specific 32 bit, UL Listed BACnet (BTL certified) controllers, field mounted configured as per Data Point Summary for respective building services and as per below distributions. The controller shall be housed in vandal proof lockable MS cabinets. The Expansion controller connected with Controller shall also be 32 Bit, UL Listed BACnet(BTL)/Mod Bus controller and communication with Expansion units to Main Controller shall be on BACnet MS/TP. Proprietry Protocol shall not be accepted.				
	Chiller / Pump / Cooling Tower / Isolation valve DDC/IOM				
	Field Devices (In scope of Contractor)				
	Immersion type temperature sensors with all accessories for measuring temperature of Chilled and Condenser Header Temperature				
	Outside air & temperature sensor				
	Peripheral Systems				
	Interface for software integration on Chiller on N2/BACnet MS/TP protocol				
	2 core, ATC, multistrand, 1.0 sqmm, twisted, shielded, FRLS PVC sheathed cable (BAS Signal)				
	25 mm GI Conduit.				
2	**Pumps**				
2.1	**Primary Chilled Water Pumps with VFD**				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, installation, testing and commissioning of primary variable speed pumping system with Horizontal/Vertical split case double suction centrifugal pump set with bronze impeller, TEFC IP-55 motor (IE-2) with class 'F' insulation and complete with base plate, foundation, all necessary civil works, insulation and consisting of adjustable frequency drive (AFD) for each pump & 1 no. Microprocessor based pump controller housed within the enclosure of one of the AFD with pumping software duly down loaded single / multiple differential pressure sensor / transmitter compatible with BMS system, energy optimization sequencing system complete as per specification and datasheet . The system shall be complete in all respects and suitable for following ratings. The AFD's shall be mounted in a factory built panel and in AFD panel no internal wiring shall be permitted at site.	Nos.	3	515607	1546822
	Pump performance characteristics shall be as follows : Water flow rate =21.0 lps (334 US gpm) Head = 26 m (255 kPa) of water (1 no. pump shall act as standby)				
2.2	**Make up Water Pumps**				
	Design, Supply. Installation, testing and commissioning of horizontal monoblock pumping set with C.I body and bronze impeller, shaft of SS-316 and M.S base & head, mechanical seal, connected to a TEFC induction motor suitable for 400/440 volts, 3 phase 50 cycle A.C supply with 150mm dia pressure guage with gun metal isolation cock, Vibration eliminating pads under foundations, 80x40 mm M.S section base plate bolted to cement concrete foundations complete.	Nos.	2	121681	243362
	Pump performance characteristics shall be as follows :				
	Water flow rate = 5.0 lps (80 US gpm)				
	Head = 45 m (441 kPa) of water				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Pump head specified on the Drawings and / or Equipment Schedules are for guidance and information only and are calculated based on assumed equipment pressure drops. The exact pump head based on the pipe run and the offered equipment shall be carefully checked and re-calculated for each pump before ordering the equipment. Calculation shall be submitted for approval. No modification to the piping system shall be allowed without prior approval. Any additional cost for the modification of the system (pumps, motors, switchgears, cables, panel boards, switchboards, etc.) necessary to meet the specified duties, special conditions and the offered equipment shall be provided at no extra cost to the Employer.				
4	**Air Handling Units(Double Skin)**				
	Supply, installing, testing and commissioning of Air Handling Unit double skin type (Euro Vent Certified for mechanical & unit Performance), complete with blowers, fan section, cooling coils, coil section,V filter section with 50mm thick panel type filters, fan motor(IE-2), isolator for motor belt drive , with UVC emitter fitted etc. AHU shall be with cooling coil minimum 4/6 Row Deep and fin spacing shall be Max 10 FPI. The complete compartmentation shall be provided in fan and coil section.				
a)	Cap. 17500 CFM, 30 TR with suitable VFD- Entrence Lobby	No.	1	635000	635000
b)	Cap. 17500 CFM, 40 TR with suitable VFD- For Second Floor office, UPS, Simulator Room.	Nos.	4	1011388	4045551
c)	Cap. 17500 CFM, 40 TR with suitable VFD-For Third floor PTR and office	Nos.	4	1011388	4045551
5	**Fan Coil Units**				
	Supply, installing, testing and commissioning of Fan Coil unit complete with fan section, cooling coil(AHRI certified), filter section with standard filters, fan motor, return air plenum etc. as per specifications and data sheet, Including drip tray over whole unit and valve assembly.				
a)	Capacity 2.5 TR	Nos.	23	69443	1597190

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b)	Capacity 2.0 TR	Nos.	15	65523	982852
c)	Capacity 1.5 TR	Nos.	14	58156	814190
d)	Capacity 1.0TR	Nos.	17	63524	1079902
6	**Precision AC**				
	Floor Mounted, Bottom discharge, Air Cooled DX type CRAC units for server room application, guaranteeing precise control of Data Centres and server room, with Variable Capacity Scroll compressor Nominal Capacity . - 20 TR (3 Working + 1 Standby)	Nos.	4	3525759	14103034
	TOTAL OF HEAD-H01				**51821095**
H.02	**CHILLED WATER/PIPING/VALVES**				
1	**CHILLED WATER PIPING/VALVES**				
1.1	**Chilled Water Piping**				
	Design, Supply. Installation, testing and commissioning of MS C class Chilled water piping complete with companion flanges, nuts, bolts, gaskets fittings supports etc. as required and as per specifications and drawings including all necessary civil work Duly Insulated(nitrile rubber) as per specifications.				
a)	150 mm	RM	125	3082	385239
b)	100 mm	RM	250	2171	542724
d)	80 mm	RM	175	1649	288527
e)	65 mm	RM	75	1395	104656
f)	50 mm	RM	130	1129	146741
g)	40 mm	RM	250	900	224978
h)	32 mm	RM	150	792	118821
i)	25 mm	RM	150	667	99990
j)	20 mm	RM	150	581	87158

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.2	Thermal insulation pipe section Rock wool Chilled water Pipes Insulation density 100 - 125kg/m3				
a)	150mm dia	RM	125	1050	131300
b)	100mm dia	RM	250	906	226493
d)	80mm dia	RM	175	762	133270
e)	65mm dia	RM	100	670	66963
f)	50mm dia	RM	130	604	78517
g)	40mm dia	RM	200	525	105040
h)	32mm dia	RM	150	486	72872
i)	25mm dia	RM	150	407	61055
j)	Drain Pipe	RM	150	421	63221
1.4	Design, Supply. Installation, testing and commissioning of Manually Operated Butterfly Valve will flanges gasket duly insulated as per technical specifications				
a)	150mm	Nos.	9	5449	49041
b)	100 mm	Nos.	43	8488	364986
c)	80 mm	Nos.	14	5177	72482
d)	65 mm	Nos.	8	4377	35019
e)	50 mm	Nos.	6	3633	21798
1.5	Design, Supply. Installation, testing and commissioning of Balancing Valves duly insulated as per technical specifications				
a)	100 mm	Nos.	18	32230	580142
b)	80 mm	Nos.	12	23487	281838
c)	65 mm	Nos.	7	14365	100557
d)	50 mm	Nos.	7	9632	67427
e)	25mm	Nos.	85	1674	142296
1.6	Design, Supply. Installation, testing and commissioning of Gate/Ball valve with insulation as per technical specifications				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	50 mm	Nos.	12	4455	53461
b)	32mm	Nos.	20	1430	28597
c)	25 mm	Nos.	130	1922	249864
d)	20 mm	Nos.	18	1922	34597
1.7	Drain Valve of following sizes with insulation as per technical specifications				0
	50mm dia	Nos	7	2138	14963
	32mm dia	Nos	10	1690	16898
	25mm dia	Nos	32	1430	45755
1.8	Design, Supply. Installation, testing and commissioning of Non-return Valve with insulation as per technical specifications				
a)	100 mm	Nos.	6	13321	79925
1.9	Design, Supply. Installation, testing and commissioning of MS Y Type Strainer with insulation as per technical specifications				
a)	100 mm	Nos.	6	14899	89391
2	Design, Supply. Installation, testing and commissioning of Pressure Independent Control Valve Vet factory fitted with (GM) Ball valve and Y-Strainer at return and (GM) Ball valve at supply for FCUs as per technical specification.				
a)	100mm	Nos.	20	4057	81143
b)	25 mm	Nos.	73	16118	1176642
c)	20 mm	Nos.	16	15678	250855
					0
2.1	Design, Supply. Installation, testing and commissioning of Motorised Butterfly Valves complete with actuator (Should be BMS compatible) with insulation as per specification.				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	150 mm	Nos.	6	18378	110269
2.2	Design, Supply. Installation, testing and commissioning of Pressure Independent Control Valve for AHUs as per specification.				
a)	80 mm	Nos.	9	56304	506739
2.3	Design, Supply. Installation, testing and commissioning of following:				
a)	Pressure Gauges with nipple, elbow and ball valve including of syphon & lock.	Nos.	58	2689	155940
b)	Thermometers	Nos.	46	1889	86880
c)	Flow Switches	Nos.	9	1067	9599
d)	Automatic Air Vents	Nos.	9	1144	10299
e)	Differential Pressure Switch	Nos.	1	1833	1833
f)	Water level switch for expansion tank	Nos.	1	7833	7833
2.4	Design, Supply. Installation, testing and commissioning of following GI medium class drain piping with necessary clamps, support, fittings insulated as per technical specification.				
a)	50 mm	RM	35	1155	40440
b)	40 mm	RM	30	955	28664
c)	32 mm	RM	25	833	20831
d)	25 mm	RM	35	700	24498
e)	20 mm	RM	25	589	14721
f)	15 mm	RM	10	428	4277
2.5	Design, Supply. Installation, testing and commissioning of Closed type Expansion Tank of size for operating pressure as per technical specifications.				
a)	150 Ltrs. Capacity	No.	1	162039	162039

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
6	Design, Supply. Installation, testing and commissioning of Flexible Connection at inlet / outlet of condensers, chillers and cooling tower etc inlet suitable for pipe sizes as given below.				
a)	150 mm	Nos.	12	12465	149585
c)	100 mm	Nos.	30	10621	318635
d)	80 mm	Nos.	35	6955	243420
e)	65 mm	Nos.	25	3988	99712

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
f)	50 mm	Nos.	25	3724	93102
g)	25 mm	Nos.	73	3513	256448
h)	20 mm	Nos.	140	2394	335189
	TOTAL OF HEAD-H02				**9456193**
H.03	**VENTILATION SYSTEM**				
1	**Vane Axial Type Fans**				
a)	Design, Supply. Installation, testing and commissioning of Vane Axial flow fans including motors, anti vibration mounts, flexible sleeves. Fan motors and all accessories shall be complete as per Specifications.				
	Capacity 30000 CFM at 25 mm static pressure -SHAFT-1	Nos.	2	824171	1648343
	Design, Supply. Installation, testing and commissioning of Vane Axial flow fans including motors, anti vibration mounts, flexible sleeves. Fan motors and all accessories shall be complete as per Specifications.				
b)	Capacity 40000 CFM at 25 mm static pressure -SHAFT-2	Nos.	2	1185447	2370895
2	**Inline Fans**				
	Design, Supply. Installation, testing and commissioning of Inline fan with centrifugal blower driven by TEFC (Totally enclosed Fan Cooled) squirrel Cage motor. The motor shall be suitable for 415 Volts, 3 Phase, 50 HZ, AC supply and as per specifications.				
a)	Toilet Exhaust - Capacity 3000 CFM at 25 mm static pressure-Admin Building	Nos.	6	168951	1013705
b)	Lift and Staircase Pressurization (these units include extruded aluminium wiremesh filter / washable synthetic filters) at inlet side and fire retardant flexible connection at outlet side.				
	Capacity 14000 CFM at 25 mm static pressure-Lift and Lobby of Admin Building	Nos.	2	446448	892895
	Capacity 16000 CFM at 25 mm static pressure-Staircase of Admin Building	Nos.	2	446448	892895

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3	**Propeller Type Fans**				
	Design, Supply. Installation, testing and commissioning of Propeller type fan complete with motor suitable for 240 volts, 1 phase, 50 Hz AC supply, mounting frames and louvers and complete as per specifications.				
a)	Size 450 mm dia	Nos.	10	7320	73204
4	**Smoke Exhaust Fire Rated Axial Fans**				
	Design, Supply. Installation, testing and commissioning of Fire Rated Exhaust type fan complete with motor suitable for 415 volt, 3 phase, 50 Hz AC supply, motor and fan shall be rated at 250 deg C for 2 Hrs, mounting frames and louvers and complete as per specifications.				
a)	Capacity 10000 CFM- For OCC	Nos.	6	139378	836270
	TOTAL OF HEAD-H03				**7728206**
H.04	**AIR DISTRIBUTION SYSTEM**				
1A	Design, Supply. Installation, testing and commissioning of factory fabricated G.I. Sheet metal ducts (275 GSM) with flanges complete with supports, vanes, dampers, links, levers and quadrants etc. as per specifications and drawings. The rates shall include all materials of the duct and labour for suspension and supporting arrangement for plenums, ducts, complete with fire retardant flexible connection as required and as per specifications.				
a)	0.63 MM (24 Gauge)	sqm	3500	944	3305225
b)	0.80 MM (22 Gauge)	sqm	2100	1067	2239776
c)	1.00 MM (20 Gauge)	sqm	500	1211	605495
d)	1.25 MM (18 Gauge)	sqm	125	1367	170816

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1B	Design, Supply. Installation, testing and commissioning of Fire rated GI sheet metal ducts with flanges complete with supports, vanes, dampers, links, levers and quadrants etc. as per specifications and drawings. The rates shall include all materials of the duct and labour for suspension and supporting arrangement for plenums, ducts, complete with fire retardant flexible connection as required and as per specifications.				
	Sheet metal duct painted with fibre-resistant paint and 100mm thick 120kg/m3 density rock wool insulation(price shall include cost of paint and rock wool insulation)				
a)	0.63 MM (24 Gauge)	sqm	125	2189	273584
b)	0.80 MM (22 Gauge)	sqm	70	2311	161762
c)	1.00 MM (20 Gauge)	sqm	20	2455	49106
d)	1.25 MM (18 Gauge)	sqm	20	2611	52217
2	**Grills and Dampers**				
2.1	**G.I construction Duct Dampers**				
	Design, Supply. Installation, testing and commissioning of G.I construction Duct Dampers for Controlling the Airflow in Ducts as per specification.	Sqm	50	13132	656601
2.2	**Grilles without Dampers**				
	Design, Supply. Installation, testing and commissioning of powder coated extruded aluminum sections grills as per specification.	Sqm	90	4766	428957
2.3	**Grilles with Dampers**				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Design, Supply. Installation, testing and commissioning of powder coated extruded aluminium section grills with dampers for supply air terminal for air-conditioning as per specification.	Sqm	90	10643	957904
2.4	**Diffusers**				
	Design, Supply. Installation, testing and commissioning of powder coated extruded aluminium square diffusers with antismudge ring and removable core.				
a)	Supply air with dampers	Sqm	14	11454	160362
b)	Return air without damper	Sqm	14	7866	110122
2.5	**Slot Diffusers**				
	Design, Supply. Installation, testing and commissioning of slot diffusers with/without damper as specified below and as per specification.				
c)	150mm with damper	Nos	30	2733	81992
d)	150mm without damper	Nos	30	2733	81992
3	**Exhaust/Fresh Air Louvers**				
	Design, Supply. Installation, testing and commissioning of exhaust air/fresh air louvers of powder coated extruded aluminium construction with bird screen, minimum 80 mm deep.	Sqm	25	13643	341077
4	**Motorized Fire Damper**				
	Supplying, installation, testing and commissioning of motorized type fire and smoke dampers with actuators and dampers of 18 gauge GI sheet construction suitable for 120 minute fire rating.	Sqm	10	58183	581831
5	**Fire Damper with Spring and Fusible Link**				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supplying, installation, testing and commissioning of Fusible Link type fire and smoke dampers of 18 gauge GI sheet construction suitable for 120 minute fire rating.	Sqm	5	13054	65271
	Supplying, installation, testing & commissioning of external thermal insulation on ducts with closed cell cross linked Polythylene (XLPE) foam of density 33 Kg/m3 with 13 mm thick & thermal conductivity not exceeding 0-035 w/mk at an average temp of 40 ^{o}c. The material shall be rated as class 1 as per BS 476, part7. the smoke density as per AS-1530.3 shall not exceed 1. the material shall have fire approval fron CBRI, rorkee and no toxicity under flamming & non-flaming condition as per AITM 3.000 (1993). Adhesive used for setting the insulation shall be non-flamable vapour proof. all joints should be sealed with 3mm thick, 50mm wide PE tape & flange to be overlapped with 6" width of same material thickness. finally duct insulated should be strapped by 12mm plastic packing strip at every random meter & conforming to standard specification.	Sqm	30	630	18901
	13mm thick closed cell cross linked polyethylene (XLPE) foam with factory laminated Aluminium PE foil for supply air duct.				
	Supplying and fixing of accoustic lining of duct with fiber glass rigid board of density 48 kg/m3sealed in fiberglass tissue paper and covered with 0.5mm perforated aluminium sheet & conforming to standard specification. 12mm thick fiber glass rigid board.	Sqm	30	953	28580
6	**Duct Insulation**				
	Design, Supply. Installation, testing and commissioning of insulation on the surface of the duct per specifications . The rates shall include all materials of the insulation and labour works with adhesive, complete as required and specifications.				
a)	13 mm	Sqm	700	783	548279
b)	19 mm	Sqm	3000	901	2703063
c)	25 mm	Sqm	200	1035	207090

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
7	**Acoustic Lining**				
	Design, Supply. Installation, testing and commissioning of acoustic lining within supply air ducts as per the specifications. All ducts specified in the specification shall be provided with acoustic lining of fibre glass insulation as per the specifications.	Sqm	550	791	435068
8	**Acoustic Lining AHU's Room**				
	Design, Supply. Installation, testing and commissioning of Acoustic Lining AHU's Rooms. The walls and ceiling of the AHU rooms shall be provided with 50 mm thick resin bonded fibre glass of density 32 Kg/m3 and finish the above surface with 24 G Al. perforated sheet (20% perforations) fixed with Aluminium/brass screws.	Sqm	1500	1510	2264774
9	**Aluminium Cladding**				
	Design, Supply. Installation, testing and commissioning of aluminium cladding for piping as per the specifications.	Sqm	325	771	250586
	TOTAL OF HEAD-H04				**16780430**
H.05	**CHEMICAL DOSING**				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING VAC System					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	Design, Supply. Installation, testing and commissioning of chemical dozing arrangement complete with three sets of tanks with associated items like pump, piping, valves and chemicals for condenser circuit and one pump with associated items for chilled water circuits.	set	1	257074	257074
	The tanks requirements are as follows.				
	For condenser circuit.				
a)	algea prevention				
b)	Bio side prevention				
c)	PH value maintenance				
	For Chiller circuit.				
d)	PH value maintenance				
	TOTAL OF HEAD-H05				**257074**
	TOTAL OF ALL HEADS				**86042999**

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01	**FIRE DETECTION & ALARM SYSTEM**				
1	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-critical detectors below false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	320	1555	497728
2	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-criteria detectors above false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	12	1555	18665
3	Supply, installation, testing and commissioning of plug-in type rate of rise cum fixed temperature addressable analogue Heat detectors including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	Nos.	7	1444	10110
4	Supply, installation, testing and commissioning of '4" Loop (750 Detectors, 400 Devices) (Fire Alarm Capability: 1 Loop x 99//125/150 detectors/ devices) wall recess mounting microprocessor based analogue addressable Fire Control Panel expandable by minimum 2 additional loops (Fire loop shall be closed type) with minimum 80 character LCD display, 4 access levels, 1000 events historical logging, flash E-PROM, 240 volts ac power supply, automatic battery charger, 24V SLA batteries suitable for operating the entire system including the talk back units and the hooters/strobes for a minimum of 8 hours in battery condition. The Panel shall have suitable power amplifiers for hooter/strobes. The Panel shall be capable of being Integrated with the BMS System and shall include cost of supply and installation of any additional modules or interfaces required for the same. The pannel shall be complete as per specifications and as required.	Nos.	1	83325	83325
5	Supply, installation, testing and commissioning of Repeater panel including the cost of mounting accessories complete as per specifications and as required	Nos.	1	55550	55550
6	Supply installation testing and commissioning of dust and vermin proof addressable analogue Manual Call Boxes to initiate audio visual alarm including the cost of mounting accessories complete as per specifications and as required.	Nos.	32	2333	74659

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
7	Supply installation testing and commissioning of addressable analogue Talk Back jacks with face plates for Fireman's Handsets to initiate audio conversation with Main Fire Alarm Panel including the cost of mounting accessories complete as per specifications and as required.	Nos.	16	6374	101992
8	Supply, installation, testing and commissioning of Wall/ Ceiling mounting Sounder & strobes for visual indication including the cost of mounting accessories complete as per specifications and as required.	Nos.	32	1222	39107
9	Supply, installation, testing and commissioning of Control Modules including the cost of mounting accessories complete as per specifications and as required.	Nos.	32	2333	74659
10	Supply, installation, testing and commissioning of Monitor Modules including the cost of mounting accessories complete as per specifications and as required.	Nos.	14	2333	32663
11	Supply, installation, testing and commissioning of Fault Isolator Modules including the cost of mounting accessories complete as per specifications and complete as required.	Nos.	14	2111	29553
12	Supply installation testing and commissioning of two way Talk Back handsets to initiate audio interface complete as required.	Nos.	4	13970	55879
13	Supply, installation, testing and commissioning of wall or ceiling mounted 240 Volt AC illuminated double sided pictorial exit signs provided with appropriate direction arrow painted in green on white with an 11W CFL Lamp including the cost of in-built rechargeable batteries with charger suitable for 90 minute operation and including the cost of accessories for surface/ recessed or ceiling suspended mounting complete as required.	Nos.	14	7658	107208
14	Supply, installation, testing and commissioning of Response Indicator Lamp assembly in a dust tight sheet steel enclosure as per detailed specifications including accessories for recess mounting as per approved sample as required.	Nos.	100	244	24442

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
15	Supplying, Laying, Termination, Testing and commissioning of size**2C x 1.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	2,200	72	158873
16	Supplying, Laying, Termination, Testing and commissioning of size**2C x 2.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	2,200	79	173538
17	Supplying, installing, testing and commissioning of following sizes 16 gage GI conduits recessed/surface as required including clamps, hardwares etc required for conduiting arrangement complete as per specifications. (Quoted price shall include GI flexible conduits to connect from ceiling to false ceiling)				
a)	20 mm dia	Mtrs.	50	149	7455
b)	25 mm dia	Mtrs.	2,000	171	342188
18	Supply, installation, testing and commissioning of Sub alarm panel including the cost of mounting accessories complete as per specifications and as required	Nos.	1	302588	302588
	TOTAL FOR F.01				**2190182**
F.02	**FIRE FIGHTING SYSTEM**				
1.1	Providing, laying, jointing and testing in trenches the following sizes of G.I. class `C' (heavy class) pipes conforming to IS:3589 & IS:1239 with accessories like fittings including tees, elbows, reducers, flanges, rubber gaskets, GI nuts, bolts and washers and providing protection to embedded G.I. pipes and fittings by applying pypkote primer (@ 100 gm/sqm) thereafter wrapping 4 mm thick pypkote (AW 4 mm) protection coating by thermo fusion process. Overlap shall be maintained at 15 mm. The application process shall be strictly according to manufacturer's specification, inclusing necessary excavation trenches and refilling as required. **(For under ground works)**				
1.1.1	80 mm dia	Mtr.	200	1133	226644
1.1.2	100 mm dia	Mtr.	550	1533	843249

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.1.3	150 mm dia	Mtr.	2,500	2166	5416125
1.1.4	200 mm dia	Mtr.	10	2977	29775
1.2	Providing, laying, jointing, testing and commissioning of following sizes of pipes conforming to IS:3589 & IS-1239 with all accessories like all fittings (standard G.I. fitting with welded joint shall be used on the pipes) including tees, elbows, reducers, union, flanges, rubber gaskets, GI nuts bolts, washer including supporting/fixing the pipe on floor / wall /ceiling with clamps, hangers (using anchor fastners) or angle iron support work in trenches as per specification. G.I. pipe sleeve of suitable higher size shall be provided wherever the pipes are crossing the walls/floors and sealing the sleeves with glass wool in between & fire sealent compound at either end all as per Project Manager's / Consultants requirements including cutting holes and chases in brick and making good the same to original conditions complete in all respects. **(For above ground works)**				
	All hangers, clamps, brackets etc. shall be of galvanized iron unless specified otherwire and then supply of the same shall also be included for rates under this head. Including two coats of synthetic enamel paint of approved shade over a coat of primer. Prior to application of primer the surface should be cleaned for any dirt, rusts, rough substance etc. Including painting of legends both direction arrow as per the approval of the Project Manager.				
	welding of any kind on galvanized support / hanger shall not be permitted				
1.2.1	25 mm dia	Mtrs.	360	344	123988
1.2.2	32 mm dia	Mtrs.	100	444	44440
1.2.3	40 mm dia	Mtrs.	330	500	164984
1.2.4	50 mm dia	Mtrs.	130	700	90991
1.2.5	65 mm dia	Mtrs.	60	822	49328
1.2.6	80 mm dia	Mtrs.	180	1033	185981
1.2.7	100 mm dia	Mtrs.	180	1422	255974
1.2.8	150 mm dia	Mtrs.	100	2222	222200
1.2.9	200 mm dia (wall thickness 6 mm.)	Mtrs.	10	2722	27220
1.2.10	250 mm dia (wall thickness 6 mm.)	Mtrs.	10	3389	33886

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.3	Providing & fixing controlled RRL fire hose pipe (as per IS:636) of 63 mm dia and 15 meter length rated for brust pressure of 35.7 Kg/sqcm. Hose shall be complete with ISI marked S.S male & female coupling (IS:903) bound & riveted to hose pipe with copper rivets & 1.5 mm copper wire.	Each	36	4524	162875
1.4	Providing and Fixing stainless steel 63 mm dia instantaneous pattern branch short pipe, 20 mm dia nozzle conforming to IS 903, suitable for inter connection to hose pipe coupling complete as required.	Each	18	2076	37365
1.5	Constructing masonry chamber 90x90x120 cms inside with 75 class designation brick work in cement mortar 1:5 (1 cement : 5 fine sand) for valve with 560 mm dia. SFRC Manhole cover with frame (Heavy duty) and R.C.C. top slab 1:2:4 mix (1cement:2 coarse sand : 4 graded stone aggregate 20 mm nominal size) necessary excavation foundation concrete 1:5:10 mix (1 cement : 5 fine sand and 10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1cement :3 coarse sand) 12 mm thick finished with a floating coat of neat cement complete as per standard design with FPS bricks.	Nos.	5	12973	64863
1.6	Providing & fixing Gun Metal fire brigade connection unit consisting of 4 No. 63 mm dia instantaneous type male couplings with built-in check valves, 1 No., 150 mm dia flanged outlet complete with bolts, nuts and rubber insertions as required and as per IS standards	Each	2	16998	33997
1.7	Providing & fixing Stainless steel cabinet (to enclose FB connection,draw off connection & for external hydrants) fabricated from 16 g sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx 0.75m x 0.6m x 0.25m)	Each	2	16607	33214
1.8	Providing and fixing single acting air release valve with screwed inlet 20 mm dia.	Each	5	1968	9839

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.9	The rate shall include supply and fixing **Gun metal ball valve** CI hand wheel suitable for pressure 15 Kg/sqcm. and confirming to relevant IS of the following size including providing necessary union/flange and making proper connection for air testing and drainage system.				
1.9.1	50 mm dia	Nos	12	5666	67993
1.10	Providing and fixing pre fabricated 4 mm thick glass door (with SS frame) of size 2.1 m x 0.9 m with center opening for fire hose cabinet suitabely marked on the outside with the letters "FIRE HOSE" including locking arrangement suitable and including with 1 No Hydrant landing valves, 1no fire hose reel, 2 Nos.15 m long 63 mm dia hose pipe,1 no branch pipe, 1No. fire man's axe and 2 Nos fire extiguishers.	Each	18	23870	429660
1.11	Supplying and fixing of hose cabinet fabricated from of size 900 mm x 600 mm x 450 mm made of 3 mm aluminium sheet with 6 mm thick glazed glass doors i/c necessary locking arrangement suitable and including with external hydrant valve, with butter fly valve, 2 Nos.15 mtr. Long Hose pipe, 1 No. branch pipe, mounted on wall OR raised brick platform 600mm in height built in brick masonary in cement mortat 1:5, 12mm thick plaster on all sides and finished with existing/ proposed external finish & duly painted with Post office red externally and white internally with synthetic enamel paint completein all respect, for external hydrants, as required.	Each	10	10666	106656
1.12	Providing and fixing dial type pressure gauge (SS casing) with isolation cock and pipe.				
1.12.1	Dial diameter 100 mm caliberation 0-15 kg	Each	30	1444	43329
1.13	Providing & fixing butterfly valve tested to a pressure not less than 15 Kg/Sq.cm. Including rubber gasket, flanges, nuts, bolts, washers & painting complete as required.				
1.13.1	65 mm dia	Each	4	3222	12888
1.13.2	80 mm dia	Each	6	3555	21331
1.13.3	100 mm dia	Each	3	4555	13665
1.13.4	150 mm dia	Each	15	6555	98324
1.13.5	200 mm dia	Each	4	16332	65327

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.14	Providing & fixing dual plate CI wafer type check valve tested to a pressure of 15 Kg/sqcm. Including rubber gasket, flanges, union, nuts, bolts, washers & painting complete as required.				
1.14.1	65 mm dia	Each	10	3333	33330
1.14.2	100 mm dia	Each	10	5555	55550
1.14.3	150 mm dia	Each	10	9777	97768
1.15	Designing, providing and fixing Orifice plate made out of stainless steel plate (thickness as per specification) for 80/100/150 mm dia. pipe to reduce pressure upto 3.5 Kg/sqcm complete in all respects.	Each	18	1555	27997
1.16	Providing and fixing standard firemans axe with heavy rubber handle.	Each	4	667	2666
1.17	Providing and laying non-pressure NP2 class (light duty) R.C.C pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc.complete.				
1.17.1	250 mm dia. **R.C.C pipe**	Mtr.	50	929	46468
1.18	Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) all-round R.C.C pipes including bed concrete as per standard design.				
1.18.1	250 mm dia. **R.C.C pipe**	Mtr.	60	3304	198242
1.19	Providing & fixing brass quartzoid sprinklers (UL approved) of 15 mm dia size, suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :				
1.19.1	Spray recessed (adjustable) without rossette (ss) (68 deg.C) standard sprinkler (Pendant / Upright Type)	Each	510	333	169983
1.19.2	Supplying 15 mm size quartzoid bulb type sprinklers ,of rating 68 degree C. pendent / upright with required accessories. (spare)	Each	10	333	3333

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.19.3	Providing and fixing inspector's test assembly complete with test value, sight glass sectional drain valve union with corrosion resistant orifice all complete	Each	5	8304	41521
1.20	Supply, installation, testing and commissioning of electrically driven multistage, single outlet high pressure centrifugal type fire hydrant /sprinkler pump, suitable for automatic operation consisting of the following:				
	Horizontal multistage, single outlet, **split casing** centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ AC supply. The installation shall be complete with flexible coupling and coupling guard as required. Fire pump shall have CI casing, CS diffusers, bronze impeller (hard finished and dynamically balanced) and SS (304) shaft with mechanical seal, capable for **delivering 2850 LPM at outlet head of 90 mtrs.** to ensure a minimum pressure of 3.5 Kg/Sqcm at the farthest or topmost hydrant / sprinkler. The installation shall be complete with necessary pressure gauge on delivery side.				
	Squirrel cage induction motor, TEFC type suitable for operation on 415 volts, 3 phase 50 HZ A.C supply, for the above pump with synchronous speed of **1500 RPM,** conforming to IP 55 protection & class F insulation. The motor shall conform to IS 325-1978 (up to date).				
	Common base plate for (a) and (b) from M.S. Channel for required size.	Each	2	411070	822140
1.21	Supply, installation, testing and commissioning of **Jockey pump** (pressurisation pump) comprising of the following:				
	Vertical centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ A.C supply. The installation shall be complete with Flexible coupling and coupling guard, complete as required.				
	The pump casing shall be CI, shaft shall be SS & impeller/ shaft sleeve/casing wearing ring shall be bronze. The pump shall be provided with mechanical seal The system shall be complete with necessary pressure gauge with gun metal shut off cock on delivery side.				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.21	Squirrel cage induction motor TEFC type for operation on 415 V, 3 phase 50 Hz AC supply for the above pump with a synchronous speed of **2900 RPM** as required.				
	Common base plate for (a) and (b) from M.S. channel as required size.				
	For pump defined above & of duty as follows :				
	Flow : **180 LPM**				
	Head : **90 MTRS**	Each	1	94435	94435
1.22	Providing and fixing carbon-di-oxide type fire extinguishers consisting of welded M.S. cylinderical body, squeeze lever discharge valve fitted with pressure indicating guage internal discharge tube 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket conforming to IS:15683 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge.				
1.22.1	Capacity **4.5 Kg.**	Each	30	4555	136653
1.23	Providing and fixing carbon-di-oxide fire extingushers trolley mounted with all accessories internal discharge tube,high pressure discharge hose,discharge nozzle, ISI marked as per IS:2878 finished externally with red enamel paint.				
1.23.1	Capacity **22.5 kg.**	Each	2	14332	28664
1.24	Providing and fixing ABC Powder type fire extinguishers consisting of welded M.S. cylinderical body, squeeze lever discharge valve fitted with pressure indicating guage internal discharge tube 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket conforming to IS:15683 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge.				
1.24.1	Capacity **6.0/5.0 Kg.**	Each	20	2810	56207

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.25	Providing and fixing fire extinguisher water type of capacity **9 litre** with internal plastic lining and IS marked as per IS 940 with gun metal cap, CO2 cartridge and initial refill.	Each	8	1889	15110
1.26	The rate shall include providing two coats of synthetic enamel paint of approved shade over two coats of primer on pipes, fittings and supports, including painting of legends both direction arrow as per the approval of the Engineer.				
1.26.1	25 mm dia	Mtrs	360	20	7199
1.26.2	32 mm dia	Mtrs	100	22	2222
1.26.3	40 mm dia	Mtrs	330	28	9166
1.26.4	50 mm dia	Mtrs	130	33	4333
1.26.5	65 mm dia	Mtrs	60	39	2333
1.26.6	80 mm dia	Mtrs	180	44	7999
1.26.7	100 mm dia	Mtrs	180	50	8999
1.26.8	150 mm dia	Mtrs	100	56	5555
1.26.9	200 mm dia	Mtrs	10	67	667
1.26.10	250 mm dia	Mtrs	10	78	778
	TOTAL FOR F.02				**10795427**
F.03 A	**CLEAN AGENT BASED PANEL FLOODING SYSTEM -FIRE TRACE TUBE SYSTEM**				
1	Supply, fixing, testing and commissioning of UL 521, UL listed Polymer Tube Detection based Clean AgentFire Suppression System for Electrical Panels, consisting of the following components:				
1.1	Direct Low Pressure Clean Agent system **10 LBS** capacity, complete with Clean agent) (NOVEC 1230 or equivalent), D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and: **INCLUDING**	Nos.	6	76659	459954

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.2	Fill Port				
1.3	Outlet Port				
1.4	End of Line adaptor,				
1.5	End of line Adopter - 2 Nos.				
1.6	Pressure switch				
1.7	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.o make each entire system functional - 2 Nos.	Mtrs.	320	1055	337744
1.8	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	Nos.	6	15554	93324
1.9	Providing and fixing set of 4 fire buckets capacity 9 ltrs fabricated from 24 gauge MS sheet brackets filled with jamuna sand, two coats of anti corrosive paint inside and outside and two coats of white enamel inside and two coats of postal red enamel outside with " FIRE" marked on each bucket, including M.S. fabricated 4 bucket standard size with 4 hooks. For Hanging buckets including painting with two coats of anti corrosive primer and two coats of postal red enamel on all surfaces of approved quality and make complete in all respects.	Nos.	6	2000	11999
F.03 B	**CLEAN AGENT BASED PANEL FLOODING SYSTEM -FIRE TRACE TUBE SYSTEM**				
1	Direct Low Pressure Clean Agent system **5 LBS** capacity, complete with Clean agent **(NOVEC 1230 or equivalent)**, D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and **INCLUDING**	Nos.	6	69993	419958

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.1	Fill Port				
1.2	Outlet Port				
1.3	End of Line adaptor,				
1.4	End of line Adopter - 2 nos.				
1.5	Pressure switch				
1.6	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.o make each entire system functional - 2 Nos.	Mtrs.	320	1055	337744
1.7	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	Nos.	6	15554	93324
	Note: The items indicated above are notable items. The vendor to include all allied and implid items in required quantity at no extra cost.				
	TOTAL FOR F.03				**1754047**
F.04	**FM 200 FIRE SUPPRESSION SYSTEM**				
A	**SYSTEM UPS ROOM**				
1	120 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	5	105545	527725
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	550	2586	1422080
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	53328	53328
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	4	38380	153520

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
5	Manifold check valve	Nos.	5	21210	106050
6	Discharge pressure switch	Nos.	1	18685	18685
7	Discharge nozzles	Nos.	8	5454	43632
8	Cylinder bracket	Nos.	10	1010	10100
9	Manifold for connecting 5 cylinders	Lot	1	35350	35350
10	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
B	**CENTRAL EQUIPMENT ROOM**				
1	120 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	10	105545	1055450
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	1,020	2586	2637312
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	2	53328	106656
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	8	38380	307040
5	Manifold check valve	Nos.	10	21210	212100
6	Discharge pressure switch	Nos.	2	18685	37370
7	Discharge nozzles	Nos.	16	5454	87264

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
8	Cylinder bracket	Nos.	20	1010	20200
9	Manifold for connecting 2 cylinders	Lot	1	7070	7070
10	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
C	**OCC THEATER**				
1	120 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	15	105545	1583175
2	Chemours make FM 200 Agent filled in above cylinder (Kgs)	Kgs	1,605	2586	4149888
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	53328	53328
4	Slave cylinder kit comprising Pneumatic actuator, Actuation hose, Discharge hose, connectors etc.	Nos.	14	38380	537320
5	Manifold check valve	Nos.	15	21210	318150
6	Manifold to connect 15 cylinders	Lot	1	83325	83325
7	Pilot activation kit suitable to trigger upto 19 cylinders	Nos.	1	63226	63226
8	Release circuit disable switch (for online monitoring of solenoid coil)	Nos.	1	13736	13736
9	Tamper seal	Nos.	1	934	934
10	Discharge pressure switch	Nos.	1	18685	18685
11	Supervisory pressure switch	Nos.	15	7070	106050
12	Discharge nozzles	Nos.	24	4646	111504

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
13	Cylinder bracket	Nos.	30	909	27270
14	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191649	191649
	TOTAL FOR F.04				**14482469**
F.05	**TRANSFORMERS PROTECTION SYSTEM :**				
1	Design, Supply, Installation, Testing & Commissioning of fire protection system for transformers comprising of the following:				
1.1	45 Kg capacity CO_2, IHP Valve Assembly with automatic valve, push in connector for tube, 45 Kg CO_2 gas & mounting bracket.	Nos.	2	70700	141400
1.2	End of Line adapter	Nos.	2	3030	6060
1.3	Pressure Switch	Nos.	2	6565	13130
1.4	Linear pneumatic heat Detection Tube with all necessary fittings & supports.	RM	40	1212	48480
1.5	Master Control Unit for controlling each system, complete with pressure switches, buzzers and electronic hooters, including all necessary accessories + electrical wiring to make each entire system functional.	Nos.	2	12120	24240
1.6	Auto weight measuring unit for cylinders with automatic audio/visual alarm.	Nos.	2	11110	22220
1.7	Discharge Hose With Two nozzle Kit	Set	2	21245	42491
	TOTAL FOR F.05				**298021**
F.06	**VESDA SYSTEM FOR UPS ROOM,CENTRAL EQUIPMENT ROOM & OCC THEATER:**				

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	Short wave length laser-Based Absolute Smoke Detection system with single pipe inlet, 1000 m2 coverage; Wide sensitivity range - 0.005%–20% obs/m ; 4 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter with memory; 7Nos of inbuilt potential free relay outputs;supports linear pipe length of 100m linear or branched pipe up to 130m per pipe; supports 30 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; TCP/IP, WiFi & VESDANet connectivity for central monitoring & monitoring of Andriod/iOS tablets/smartphones, facility to include analytics for notification of smoke from Diesel and PVC wire burning, notification for dust Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA E VEP A00-1P (SYSTEM UPS ROOM B & CENTRAL EQUIPMENT ROOM)**	Nos.	2	366857	733715
2	Short wave length laser-Based Absolute Smoke Detection system with 4 pipe inlets, 2000 m2 coverage; Wide sensitivity range - 0.005%–20% obs/m; 4 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter with memory; 7Nos of inbuilt potential free relay outputs;supports linear pipe length of 70m per pipe (total 280m) or branched pipe up to 130m per pipe; supports 40 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; TCP/IP, WiFi & VESDANet connectivity for central monitoring & monitoring of Andriod/iOS tablets/smartphones, facility to include analytics for notification of smoke from Diesel and PVC wire burning, notification for dust Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA E VEP A00-P (OCC THEATER)**	Nos.	1	450460	450460
3	Capilllary sampling point set for sampling from below false ceiling (room) **E700-TA+CSC+CT+SP+SPLR**	Nos.	27	2485	67084

(Attachment No-6 to Addendum No-1) PART-C - OCC BUILDING - FIRE DETECTION & SUPPRESSION SYSTEMS					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4	Power Supply units for VEU detectors - Power supply unit operate on 230 volts AC mains input & provide 24 to 30 volt DC output for powering up the detector, support battery backup in case of AC mains failure & have built in charging circuit for batterys. Power supplies to be mounted on top of the VEU detectors as StaX units	Nos.	3	13736	41208
5	Sampling Pipe - Smooth bore UPVC or CPVC or ABS Pipe 25 mm Outer Dia & 19 to 21mm Inner Dia with all required bends joints & accesorys (approx qty of pipe)	Nos.	400	187	74740
	NOTE-Stand alone VESDA detectors proposed. Necessary hardware, cables required for integration of VESDA with fire alarm panel & Sounders need to be considered seperately BOQ proposed is for covering all the voids and dedicated return air sampling is not considered				
	TOTAL FOR F.06				**1367207**

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
E.00	**General**				
1	The BOQ specified below include the latest relevent standards (unless otherwise specified), specifications, drawing details and the contractor is required to go through them as referred in tender document while quoting the rates. All the samples/ material intended to be used in the works shall be subject to approval by the employer before use.				
2	The description as mentioned in this BOQ including details as mentioned in GCC, SCC, Employer's Requirement', General specifications & Technical specificatios , Drawing and the conditions mentioned therein whichever is stringent shall be applicable, acceptable and complied with.				
3	Sub-letting of work by the contractor shall only be permitted in accordance with Special Conditions of Contract.				
4	The items indicating zero quantity can also be operated and variation clause shall be applicable as stipulated in GCC / SCC.				
5	Bus Bar Sizing calculations shall be submitted for approval of Employer or his representative.				
6	Contractor shall quote reasonable rates against each item of BOQ (both in word and figure)				
7	Steel structure/pipe shall be earthed.				
E.01	**M V SWITCHGEAR**				
1.0	**Switch Boards/panels**				
	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty floor / wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with neoprene gaskets, fabricated from CRCA sheets steel of thickness not less than 2mm in general and load bearing members with 2.5mm and shall be folded and braced as necessary to provide a rigid support for all components with powder coated finish (minimum thickness 50 micron) suitable for 415 volts 3 phase 4 wire 50 Hz system to withstand symmetrical fault level of 50 kA for ASS Aarey Station at 415 V, including interconnections, bonding to earth etc. and flush doors conforming to relevant IEC/IS (viz. IEC 61439, IS 8623 etc.) standard including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using FRLS wires.				
a)	The Switchboards shall be provided with detachable gland plates for entry of cables from the top/bottom as required.				
b)	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. The busbars shall be insulated with heat shrinkable sleaves. SMC/DMC (Double Moulding Compound) shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.				
c)	The panel shall have Copper busbars (phases, neutral & earth) with bar type feeder connections, spacers etc.and phases & neutral busbar shall be of 100% capacity and Earthing Busbar shall be 50% of Phase.				
d)	DELETED				
e)	All accessories & supporting structures such as channels, ISMC base frame, mounting brackets, lifting lugs, panel heaters, ventilation arrangement etc as required.				
f)	Each incomer and outgoing feeder shall be provided with multiple LED type status indication lamps suitable for 230 V AC as approved.				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
g)	Overall Space provisionshall be @ 25% for future expansion				
h)	The makes of components and accessories shall, to the extent practically feasible, be same for panels and boards for uniformity, standardisation and replaceability and shall be applicable to all panels/ boards under the scope of work				
i)	Switchboard including interconnections, labeling, earthing,associated foundation / masonary work & erection etc. complete as required.				
j)	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity (Ics suitable for isolation conforming to latest IEC947-2/IS13947-2 duly marked on MCCB, at operating voltage (Ue) of 415 V, insulation voltage (Ui) 750 V and with trip free mechanism, handle indicating ON/OFF/tripped position. The breaking capacity as mentioned shall be Ics values.				
k)	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution as required and with front adjustable overload and short circuit releases and minimum electrical endurance of the order of 7000-8000 operation cycles (higher shall be preferred) for capacity of 100-250 amps..				
l)	All the MCCBs shall be provided with potential free contacts for connectivity to PLC in ESR/Pump Room for ON/OFF status and control, as required.				
m)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type, lower power loss approx 40 -70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.				
n)	Panel/board design shall be compact and components / accessories of compact sizes are used to economise the room space available. Employer reserve the right to seek compact items in place of larger ones				
o)	All incomer ACB's shall be provided with minimum 2 NO + 2 NC auxiliary contacts and all MCCBs shall be provided with 2 NO+ 2NC auxiliary contacts, and there should be provision to add min. 6 Auxiliary contacts.				
p)	All 4-pole ACBs shall have fully rated neutral pole. All 4-pole ACBs & MCCBs shall be provided earth fault protection.				
q)	The panel shall be fitted with fire trace tube system. Scheme of fire trace tube system shall be got approved by Engineer before proceeding with manufacturing and assembly.				
r)	All internal wiring to be FRLS				
s)	Various panels/boards as given below:				
1.1	**MAIN DISTRIBUTION BOARD (MDB)**	No.	1	3007031	3007031
A	**INCOMER -TRANSFORMER - I**				
	1 no. 1600 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:				
a)	1- set Red/Green ON/OFF indicating lamps				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b)	1- set of three phase (red, yellow, blue) indicating lamps				
c)	Amber healthy / trip indicating lamps				
d)	3 nos. cast resin current transformers of 1600/5A ratio with 15 VA Burden & Class 5P10 for protection				
e)	Micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting.				
f)	230 V AC shunt trip coil				
g)	230 V, AC Motor wound spring closing mechanism				
h)	Terminals to receive alum. XLPE armoured cables				
i)	RS-485 port for display of ON/OFF status, current and energy parameters etc. of ACB on BMS workstation through MODBUS protocol				
j)	Auto/Local/Remote Selector Switch Key operated				
	Note: Contractor shall provide an earmarked terminal boards for SCADA signals as per specification & requrments.				
B	**BUS-1 OUTGOINGS**				
a)	1 no. 630 A, 415V, I_{cs}= 50 kA, 4P MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
a)	2 no. 400 A, 415V, I_{cs}= 50 kA, 4P MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
b)	3 no. 200 A, 415V, Ics= 50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch..				
c)	3 no. 160 A, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
d)	1 no. 125 A, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
C	**BUS COUPLER & BUS BAR**				
a)	1 no. 1600 A, 415V, 50kA, 4P, draw out electrically operated ACB, on & off , indications				
b)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 1600 A **as per specification** suitable with stand symmetrical fault level of 50 kA. at 415 V with necessary high temp.sleeving.The neutral busbar shall be of 100% capacity.				
c)	The incomers shall be interlocked electrically & mechanically with the Bus Coupler.				
d)	RS-485 port for display of ON/OFF status, of ACB on BMS workstation through MODBUS protocol				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Note: E&M Contractor shall provide an earmarked terminal boards for SCADA signals as per specification & requirement.				
e)	Micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting.				
D	**TRANSFORMER - II INCOMING**				
	1 no. 1600 A, 415V, 50kA, 4P draw out Electrically operated ACB complete with:				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase (red, yellow, blue) indicating lamps				
c)	Amber healthy / trip indicating lamps				
d)	3 nos. cast resin current transformers of 1600/5 ratio with 15 VA Burden & Class 5P10 for protection				
e)	Micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault, Under voltage, over voltage, residual voltage & reverse power protection with adjustable setting.				
f)	230 V AC shunt trip coil				
g)	230 V, AC Motor wound spring closing mechanism				
h)	Terminals to receive alum. XLPE armoured cables				
i)	RS-485 port for display of ON/OFF status, current and energy parameters etc. of ACB on BMS workstation through MODBUS protocol				
j)	Auto/Local/Remote Selector Switch Key operated				
	Note: Contractor shall provide an earmarked terminal boards for SCADA signals as per specification & requrments.				
E	**BUS-2 OUTGOINGS**				
a)	2 no. 630 A, 415V, I_{cs}= 50 kA, 4P MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 630/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
b)	4 no. 400 A, 415V, I_{cs}= 50 kA, 4P MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 400/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
c)	3 no. 200 A, 415V, Ics= 50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 200/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
d)	1 no. 100 A, 415V, Ics=50 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
D	**METERING**				
a)	2 sets (4 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Volt meter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b)	2 No., 230V, AC operated integral type Digital Multifunction meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and suitable size summating CTs for above two incomer metering supporting SCADA/BMS connectivity				
H	**INTERLOCKING**				
	Two above two incomers & Bus Coupler shall be interlocked electrically & mechanically so that only two out of three shall be switched on at a time.				
1.2	**EMERGENCY POWER PANEL (EPP)**	**No.**	1	861087	861087
A	**INCOMER -1 (From MDB Bus-1)**				
a)	630 A, 415V, Ics=35 kA, 4P, Motorised MCCB complete with variable overcurrent and short circuit releases for Normal supply				
b	Contactor-relay based automatic changeover system complete.				
c)	1 set of Red/Green ON/OFF indicating lamps				
d)	1 set of three phase indicating lamps (red, yellow, blue)				
e)	Amber healthy/ trip indicating lamps for above feeders.				
B	**BUSBAR**				
a)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 630 A **as per specification,** suitable with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of 100% capacity.				
C	**OUTGOING UNITS (From Bus-1)**				
a)	3 nos.125Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	3 nos.63Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	5 nos.40Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**BUSCOUPLER**				
	1 nos. 630 A, 415V, Ics= 35 kA, 4P, Motorised MCCBs complete with variable overcurrent and short circuit releases				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	1- set of Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
E	**INCOMER (From MDB Bus-2)**				
a)	630 A, 415V, Ics=35 kA, 4P, Motorised MCCB complete with variable overcurrent and short circuit releases for Normal supply				
b	Contactor-relay based automatic changeover system complete.				
c)	1 set of Red/Green ON/OFF indicating lamps				
d)	1 set of three phase indicating lamps (red, yellow, blue)				
e)	Amber healthy/ trip indicating lamps for above feeders.				
F	**INCOMING FROM DG PANEL**				
	1 nos. 630 A, 415V, Ics= 35 kA, 4P, Motorised MCCBs complete with variable overcurrent and short circuit releases				
a)	1- set of Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
G	**OUTGOING UNITS (From Bus-2)**				
a)	2 nos.160Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 160/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	2 nos.125Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 125/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	8 nos.40Amps, 415V, Ics=35 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
H	**INTERLOCKING**				
a)	All incomers shall be interlocked electrically & mechanically with contactor based automatic changeover system so that only one supply is switched on at a time and fail safe restoration.				
I	**METERING**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	1 No., 230V, AC operated integral type Digital Multifunction meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVRH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
b)	1 sets (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Volt meter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders				
1.3	**MAIN LIGHTING PANEL (MLP)**	**No.**	1	888816	888816
A	**INCOMER**				
	1 no. 160A, 415V, Ics=35 kA, TPN MCCB with fixed neutral and with variable overcurrent and short circuit releases				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
B	**BUSBAR**				
a)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 160 A **as per specification,** suitable with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	15 nos.40Amps, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**Metering**				
a)	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVRH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
b)	2 sets (4 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Volt meter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with suitable size CTs connections as required for incoming feeders				
1.4	**UPS PANEL**	**No.**	1	267412	267412
A	**INCOMER**				
	1 no. 160A, 415V, Ics=35 kA, TPN MCCB with variable overcurrent and short circuit releases				
a	3 nos. cast resin current transformers of 160/5 ratio 15 VA burden with Ammeter and Ammeter Selector Switch				
b	1 Set of (0-500 volts) digital voltmeter with selector switch with 2 amps MCB.				
c	1- set Red/Green ON/OFF indicating lamps.				
d	1- set of three phase (red, yellow, blue) indicating lamps.				
e	Amber healthy/ trip indicating lamps.				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
B	**BUSBAR**				
a)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 160A **as per specification,** suitable with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phase				
C	**OUTGOING**				
a)	12 nos. 25A, 415V, Ics=25 kA,TPN MCCB and with variable overcurrent and short circuit releases & each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 25/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	02 nos. 80A, 415V, Ics=25 kA, TPN MCCB and with variable overcurrent and short circuit releases each having 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 80/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D	**Metering**				
a)	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVRH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
1.5	**AC POWER PANEL (ACPP)**	**No.**	1	3249101	3249101
A	**INCOMER**				
	200A, 415V, Ics=35 kA, TPN MCCB with variable overcurrent and short circuit releases.				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
d)	1 set (2 no.) of AC operated, 3.5 Digit, independent Digital Ammeter, Digital Volt meter similar to SMP-45 models of MECO or equivalent with necessary Circuit MCBs and with 200/5A size CTs connections as required for incoming feeders				
B	**BUSBAR**				
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 200 A **as per specification,** suitable with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	02 no. 100A, 415V, Ics=10 kA, TP MCB's with 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 100/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	05 no. 63A, 415V, Ics=10 kA, TP MCB's(Motor Duty) with 1- set Red/Green ON/OFF indicating lamps & 3 nos. cast resin current transformers of 63/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
c)	06 no. 06A, 230V, Ics=10 kA, DP MCB's with 1- set Red/Green ON/OFF indicating lamps.				
D	**Metering**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 No., 230V, AC operated integral type Digital Multifunction meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
1.6	**Aircondition Distribution Board as per specification & Drawing as per following details.**	No.	1	62469	62469
	One A C distribution board (ACDB) unit with respective incoming TPN MCBs, and outgoing SP MCBs each having indications for incoming feeder status as per specifications and as under:				
	INCOMER				
a)	1 no. 63A TPN MCB				
b)	1 set of (ON) indicating lamps for each.				
	OUTGOINGS				
a)	42 Nos of 6 A SP MCB arranged in three rows .				
1.7	**WATER PUMP PANEL**	No.	1	325826	325826
	Internal wiring in the Starters shall be done with FRLS insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 sq mm.				
A	**INCOMER**				
	125 A ,415V, Ics=35 KA , TPN MCCB with variable over current and short circuit releases.				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
d)	3 nos. cast resin current transformers of 125/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
B	**BUSBAR**				
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A **as per specification,** suitable with stand symmetrical fault level of 35kA. at 415 V. The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
a)	3 Nos. 40A, Ics = 25 kA, 415V, TP MCCB(Motor Duty) each with phase indication lamp.				
b)	6 nos. 5-32 A, Ics = 10 kA, 415 V, TP MCB (motor duty) each with phase indication lamp.				
c)	3 Nos. 16A, Ics = 10kA, 230V, DP MCB (motor duty) each with phase indication lamp.				
D	**Metering**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
E.	Presettable switching timer set for each pump				
1.8	**FIRE PUMP PANEL (FPP)**	No.	1	779936	779936

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Internal wiring in the Starters shall be done with FRLS insulated cables of adequate size. Internal wiring, contactors, relay contacts, push button contacts should be rated not less than 2.5 sq mm.				
A	**INCOMER - I from MDB**				
	1 no. 400 A, 415 V, Ics=35kA ,4P, MCCB with variable over current and short circuit releases having:				
a)	1 set of Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber trip indicating lamps				
d)	3 nos. cast resin current transformers of 400/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
B	**INCOMER - II from DG set**				
	1 no. 400 A, 415 V, Ics=35kA ,4P,MCCB with variable over current and short circuit releases having:				
a)	1 set of Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps				
d)	3 nos. cast resin current transformers of 400/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
C	**BUSBAR**				
a)	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 400 A **as per specification,** suitable with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of capacity as phases				
b)	Two incomers shall be interlocked electrically & mechanically with contactor based automatic changeover system so that only one supply is switched on at a time.				
D	**OUTGOING**				
a)	4 nos. 160 A, Ics=25 kA, 415 V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases				
a1)	4 nos. 60 HP, **Star Delta starter** comprising 3 Nos. TP contactor AC-3 duty Auto/Manual switch, Start Stop push button, bimetallic over current relays single phasing preventer and timer & with potential free contacts for remote monitoring and control.				
a2)	1 - set Red/Green ON/OFF indicating lamps				
a3)	1 no. for each feeder of AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 with necessary Circuit MCBs and with suitable size CTs, connections as required for incoming feeder and suitable selector for measuring other circuit current				
a4)	1 set of start stop push buttons.				
a5)	Auto / Manual selector switch.				
a6)	Amber healthy trip indicating lamps.				
a7)	Provision of remote start of main fire pump should be kept by pressing of push button switch.This provision shall be extended upto station control room.				
b)	2 no. 40 A, Ics= 25 kA, 415 V, TP MCCB with fixed neutral and with variable overcurrent and short circuit releases				
b1)	2 nos. upto 5 HP DOL starter with bimetallic over current relays single phasing preventer & with potential free contact for remote monitoring.				
b2)	1 – set Red/Green ON/OFF indicating lamps				
b3)	1 no. for each feeder of AC operated, 3.5 Digit, independent Digital Ammeter similar to SMP-45 with necessary Circuit MCBs and with suitable size CTs, connections as required for incoming feeder and suitable selector for measuring other circuit current				
b4)	1 set of start stop push buttons.				
b5)	Auto / Manual selector switch.				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b6)	Amber healthy trip indicating lamps				
C	**Metering**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
D	Auxiliary relay shall be provided which shall be activated by pressure switch for remote monitoring.				
1.90	**ESCALATOR POWER PANEL (ESPP)**	No.	1	457300	457300
A	**INCOMER**				
1	400 A ,415V, Ics=35 kA, TPN MCCB with variable over current and short circuit releases				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
d)	3 nos. cast resin current transformers of 400/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
B)	**BUSBAR**				
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 400 A **as per specification,** suitable with stand symmetrical fault level of 35kA at 415 V. The neutral busbar is to be of capacity as phases				
C)	**OUTGOING**				
	9 nos. 63A, Ics=25 kA, 415V, TPN MCCB with fixed neutral and with variable overcurrent and short circuit releases suitable for motor application duty suitable for elevator/escalator drive motors accessories, connections as required & 3 nos. cast resin current transformers of 63/5A ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
D)	**Metering**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
1.10	**Basement Exhaust Panel (BEP)**	No.	2	457300	914600
A	**INCOMER**				
1	125 A ,415V, Ics=35 kA, TPN MCCB with variable over current and short circuit releases.				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
d)	3 nos. cast resin current transformers of 125/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
B)	**BUSBAR**				
a	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 125 A **as per specification,** suitable with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of 50% capacity.				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
C)	**OUTGOING**				
	10 nos.25A, Ics=25 kA, 415V, TPN MCCB with fixed neutral and with variable overcurrent and short circuit releases suitable for motor application duty suitable for elevator/escalator drive motors accessories, connections as required and each having indication lamps to give status				
D)	**Metering**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
1.11	**PASSANGER AMENITIES PANEL (PAP)**	No.	1	324620	324620
A	**INCOMER**				
	1 nos. 100 A ,415V, Ics= 35 kA, TPN MCCB with variable over current and short circuit releases having:				
a)	1- set Red/Green ON/OFF indicating lamps				
b)	1- set of three phase indicating lamps (red, yellow, blue)				
c)	Amber healthy trip indicating lamps for above feeders				
d)	3 nos. cast resin current transformers of 100/5 with 15 VA Burden and Class 1.0 with Ammeter and Ammeter selector Switch.				
B)	**BUSBAR**				
	Electrolytic high conductivity tinned copper three phase and neutral busbars rated at 100 A **as per specification,** suitable with stand symmetrical fault level of 35 kA at 415 V. The neutral busbar is to be of same capacity as phases.				
C)	**OUTGOING**				
a)	10 nos. 40A Ics=25 kA, 415V, TPN MCCB with fixed neutral and with variable overcurrent and short circuit releases & 3 nos. cast resin current transformers of 40/5 ratio with 15 VA Burden and Class 1.0 with Ammeter and Ammeter Selector Switch.				
b)	Space for providing variable KVAH , Energy Meter etc with TOD facility with required CT's/PT's for each of the outgoing feeder with locking arrangement.				
D)	**Metering**				
	1 No., 230V, AC operated integral type Digital meter with RS-485 port for measuring Amps ,Voltage, Energy, kWH, kVAH, frequency, Maximum Demand & power factor etc with TOD Facility conforming to specifications, latest IEC/ EMC and EMI standards/criterion, with necessary Circuit MCBs and supporting SCADA/BMS connectivity				
1.12	**APFC PANEL**				
1.12A	**160 KVAR APFC PANEL @ STATION**	No.	2	166333	332667
A	**INCOMER**				
	1 No. 400 amps Four pole electrically operated (motorised) fully draw out type air circuit breaker 50 kA with built in micro processor based release unit for short circuit, selective short circuit, instantaneous short circuit, Earth fault with adjustable setting and with the following accessories :				
	1- set Red/Green/Amber -ON/OFF/Alarm indicating lamps				
	1- set of three phase (red, yellow, blue) indicating lamps				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	1 Set of (0-500 volts) digital voltmeter with selector switch with MCB's, and one set of Digital Ammeter with 3 nos. 400/5 Amps, 15 VA, CT				
	TNC Switch.				
	Auto/local/remote selector switch key operated.				
	1 set of suitable rating of Current Transformer for incomer in main panel for APFCR relay				
	1- set of three phase (red, yellow, blue) indicating lamps.				
	1 Set - Automatic microprocessor based digital type power factor compensating relay (including power factor meter) in 10 steps for automatic cut off or add on capacitor units to keep the power factor at 0.95 with variation of loads. All associated auxiliary contactors/relays to be provided. Visual alarms, to display shortfall of P.T., automatic lockout of faulty Step, over temperature protrections. Auto manual selection and indications.				
B	**BUSBAR**				
	Electrolytic high conductivity Copper three phase and neutral busbars rated at 400 A having a maximum current density of 1.4 A per sq mm with heat shrinkable insulation sleeves suitable to with stand symmetrical fault level of 50 kA at 415 V.The neutral busbar is to be of same size as phases.				
C	**OUTGOING**				
	Outgoing feeders consisting of following accessories.				
	1 nos. 160 amps, 35kA, TP MCCB with backup fuses of suitable capacity				
	3 nos. 80 amps,35kA, TP MCCB with backup fuses of suitable capacity				
	3 nos.63 amps,35kA,TP MCCB with backup fuses of suitable capacity				
	1 nos. 160 amps 415 volts 50Hz heavy duty contactors				
	3 nos.80 amps 415 volts 50Hz heavy duty contactors				
	3 nos. 63 amps 415 volts 50Hz heavy duty contactors				
	7 nos "ON" /"OFF" push buttons and indicating lamps				
	1 nos. 160 amps rating TP terminal blocks				
	3 nos. 80 amps rating TP terminal blocks				
	3 nos. 63 amps rating TP terminal blocks				
	1 nos. 50 KVAR capacitor units in bank form				
	3 nos. 25 KVAR capacitor units in bank form				
	2 nos. 12.5 KVAR capacitor units in bank form				
	1 nos. 10 KVAR capacitor units in bank form				
	The switchboard shall be complete with all interbconnections, risers, internal wiring, labels etc complete as required.				
1.13	**ATS**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	Supply & fixing of 200 Amp on load, four pole Automatic Transfer switch (ATS) as per relavent IEC standards with HRC fuses and indications as required, suitable for 415 V, 3 phase, 4 wire, supply with suitable MS enclosure for signaling & telecom UPS.	No.	1	1532190	1532190
b)	Supply & fixing of 125 Amp on load, four pole Automatic Transfer switch (ATS) as per relavent IEC standards with HRC fuses and indications as required, suitable for 415 V, 3 phase, 4 wire, supply with suitable MS enclosure for E&M UPS.	No.	1	1473629	1473629
1.14	**Door Limit Switch** Design, manufacture, testing, transporting to site & suitable for outdoor/Indoor installation. These are intended for use of auxiliary switches in doors & shall not be affected by dust or moisture.	**Nos.**	1	1597	1597
	Degree of protection shall be IP66 as per IEC60529				
	Insulation Voltage/Thermal current for screw terminal 2 contacts shall be 500V/10A.				
	Contact blocks shall be of NO + NC				
	Enclosure shall be of metallic type with head, body and connection modularity				
	Limit Switch head shall be of Plunger type with linear movement				
	Cable entry connector shall be of ½ ” NPT				
	limit switches of plunger type that are mechanically activated by making contact with another object. As the object makes contact with the actuator of the switch, it eventually moves the actuator to its “limit” where the contacts change state				
	Supply, installation, testing and commissioning of front operated, front access, cubicle type, indoor duty, floor / wall / recess / surface mounted (as specified below), totally enclosed dust and vermin proof control box with minimum Ingress protection classification of IP 54, fabricated from 2 mm thick CRCA sheets with dip coat priming and epoxy powder coated finish. Control box must include all interconnections, earthing and bonding requirements etc. The control box must conform to Drawings & Standards specified in relevant specifications and must include given below items.				
2	**Other accessories (Quantity per station)**				
2.1	Supply and fixing of the following safety equipments in Aux. Sub.Station/MDB room as per detailed descriptions given below and as per relevant IE rules & code of standard practice	Set	1	90805	90805
a)	1000 mm wide Insulating mat,confirming to IS 15652-2006 suitable to withstand 33 kV in front of all panels in ASS building & Pump room as required.				
b)	Laminated standard shock treatment charts in English & Hindi in ASS, ESR, DG room and Pump room in each station.				
c)	Danger plate as per approved Style & sample written in English & Hindi for MV installations as required as per IE rules, IES and IS 2551 (latest) - 8 nos. per station				
d)	2 nos. per station First Aid Box Complete as approved by St. John ambulance or Indian Red Cross.				
e)	4 nos. per station of 3-fire-buckets set each painted red with 'fire' written complete with sand filling, floor/wall mounting brackets/stand complete as per elevant IS and as required.				
f)	One Tool kit per station comprising 1 set of flat spanner (Taparia / Jalan), 1 set of box spanner, 1 no. Hacksaw frame with 10 No. blades, 1 no. large, medium, small screw drivers, 1 no. insulated plier, 1 no nose plier, 1 no. hand crimping tool upto 16 sq.mm, 1 no. digital multimeter, 1 no. test lamp and 1 no. tester. Screw driver set for all types of screw heads also to be provided.				
	TOTAL FOR E.01				**14569084**

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
E.02	**DISTRIBUTION BOARDS**				
1.0	Supply, installation, testing & commissioning of front operated front access cubical type indoor duty dead front wall / recess/ surface mounting, totally enclosed dust and vermin proof (minimum protection IP 54) panels with foamed-in neoprene gasketted hinged doors, fabricated from 2 mm thick CRCA with powder coated finish suitable for 415 V, 3-phase, 4 wire, 50 Hz system including suitably rated insulated copper busbars, interconnections, neutral bar assembly, phase segregating barriers, LED indicating lamps for incoming and outgoing feeders,15% spare space for future expansion, knockouts and gland plates for entry of cables and conduits, all internal wiring using high temperature FR wires, independant terminals for each phase, earthing terminals and including the cost of providing Master key lock on the door and pad locking facility on door as well as at incomer, bonding to earth etc. complete as per specification, drawings as required and as under:				
a)	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 10 kA at 415 V AC, current limiting type lower powerloss appx 40 - 70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for motor application duty, with minimum Electrical endurance of the order of 20000 operation cycles.				
b)	RCCB /RCBO conforming to IS 12640 shall be provided with 30mA sensitivity and electrically connected rated current capacity MCB for short circuit and over load protection as required				
c)	All incomer MCBs of boards /panels shall be provided with NO/NC contacts as specified in specifications and drawings				
d)	All the contactors shall be provided with potential free contacts for remote monitoring and control.				
e)	Various distribution boards as given below:				
1.1	**Lighting Distribution Boards (LDB) Type-1 Platform Level and basement parking as per specification and Drawing as per following details.**	No.	5	140392	701958
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs/RCBO set of contactors and outgoing SP MCBs each having indications for incoming feeder status e.g. LDB-1 is combination of LDB 1/N, LDB 1/U connected to incoming Supplies from Normal & UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:				
A	**Normal**				
	INCOMER				
a)	1 no. 63A TPN MCB				
b)	1 no. 63A TPN Contactor with astronomic digital timer				
c)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
a)	21 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
b)	3 nos. 32A DP MCB tapped from above contactor (non timer-controlled feeders)				
B	**UPS**				
	INCOMER				
a)	1 no. 25A TPN RCBO				
b)	1 no. 25A TPN Contactor with astronomic digital timer(used as a TP contactor)				
c)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
a)	10 nos. 10A SP MCB				
b)	1 no. 20A SP MCB tapped from above contactor (non timer-controlled feeders)				
1.2	**Lighting Distribution Boards (LDB) Type-1 Concourse Level as per specification and Drawing as per following details.**	No.	4	140392	561566
	One lighting distribution board (LDB) unit consisting of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs/ELCBs/RCBO set of contactors and outgoing SP MCBs each having indications for incoming feeder status e.g. LDB-1 is combination of LDB 1/N, LDB 1/U connected to incoming Supplies from Normal & UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:				
A	**Normal**				
	INCOMER				
a)	1 no. 63A TPN MCB				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	9 nos.(or as per drawing) Lighting circuit shall be controlled by contactor with one no. astronomic digital timer.				
a)	18 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
b)	3 nos. 32A DP MCB tapped from above contactor (non timer-controlled feeders)				
B	**UPS**				
	INCOMER				
a)	1 no. 25A TPN WITH RCBO				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	9 nos.(or as per drawing) Lighting circuit shall be controlled by contactor with one no. astronomic digital timer.				
a)	9 nos. 10A SP MCB				
b)	1 no. 20A SP MCB tapped from above contactor (non timer-controlled feeders)				
1.3	**Lighting Distribution Boards (LDB) Type-2 Concourse Level as per specification and Drawing as per following details.**	No.	2	97868	195736
	One lighting distribution board (LDB) unit consist of 2 compartments with respective incoming TPN MCBs, DP MCB RCCBs,RCBO set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB-2 is combination of LDB 2/N and LDB 2/U connected to incoming Supplies from Normal & UPS respectively as per specifications and as shown on Drawing and as under:				
A	**Normal**				
	INCOMER				
a)	1 no. 40A TPN MCB				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	24 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
B	**UPS**				
	INCOMER				
a)	1 no. 25A TPN RCBO				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	6 nos.(or as per drawing) Lighting circuit shall be controlled by contactor with one no. astronomic digital timer.				
a)	16 nos. 10A SP MCB				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.4	**Lighting Distribution Boards (LDB) Type-3 as per specification and Drawing as per following details.**	No.	1	53044	53044
	One lighting distribution board (LDB) unit consist of 2 compartments with respective incoming TPN MCBs set of contactors and outgoing SP MCBs each having indications for incoming & outgoing feeder status e.g. LDB-3 is combination of LDB 3/N and LDB 3/U connected to incoming Supplies from Normal & UPS respectively including a set of time switches as per specifications and as shown on Drawing and as under:				
A	**Normal**				
	INCOMER				
a)	1 no. 40A TPN MCB				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	9 nos.(or as per drawing) Lighting circuit shall be controlled by contactor with one no. astronomic digital timer.				
a)	18 nos. 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
b)	3 nos. 32A DP RCBO/MCB ELCB/RCCB tapped from above contactor (non timer-controlled feeders)				
B	**UPS**				
	INCOMER				
a)	1 no. 40A TPN MCB				
b)	1 set of (ON) indicating lamps for each				
	OUTGOINGS with feeder (ON) indication LED lamps				
	9 nos.(or as per drawing) Lighting circuit shall be controlled by contactor with one no. astronomic digital timer.				
a)	9 nos. 10A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
b)	3 nos. 32A DP RCBO/MCB ELCB/RCCB tapped from above contactor (non timer-controlled feeders)				
1.5	**Lighting Distribution Boards (LDB) Type-4 as per specification and Drawing as per following details.**	No.	1	53264	53264
	INCOMER				
a)	1 no. 40A TPN MCB				
b)	1 set of (ON) indicating lamps.				
	OUTGOINGS with feeder (ON) indication LED lamps				
a)	36 Nos of 10A/20A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
1.6	**Lighting Distribution Boards (LDB) Type-5 as per specification and Drawing as per following details.**	No.	1	53264	53264
	INCOMER				
a)	1no. 63A , Ics=35 kA ,TPN, MCCB				
b)	1 set of (ON) indicating lamps.				
	OUTGOINGS with feeder (ON) indication LED lamps				
a)	3 nos. 32A TP MCBs				
b)	9 Nos. of 20A/32A SP MCB arranged in three rows and each row controlled by one no. 32A DP RCBO/MCB ELCB/RCCB.				
	TOTAL FOR E.02				**1618830**
E.03	**MV CABLING & BUS TRUNKING**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.0	**FRLS Cable**				
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, FRLS, XLPE, aluminium (AL) / Copper (CU) conductor cables on existing trays / walls/columns/ indoor including the cost of supply and fixing, crimping lugs, double compression and weather proof brass glands, Earthing lugs and shrouds, supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.				
	Note 1: All cables 25 sqmm and above are AL conductors unless specified otherwise.				
a)	4 core 400 sq mm Al Conductor	M	400	1412	564610
b)	4 core 300 sq mm Al Conductor	M	715	1108	792538
c)	4 core 240 sq mm Al Conductor	M	80	1020	81636
d)	4 core 185 sq mm Al Conductor	M	250	742	185454
e)	4 core 150 sq mm Al Conductor	M	700	626	438001
f)	4 core 120 sq mm Al Conductor	M	50	578	28903
g)	4 core 95 sq mm Al Conductor	M	130	475	61802
h)	4 core 70 sq mm Al Conductor	M	100	368	36785
I)	4 core 50 sq mm Al Conductor	M	500	285	142375
j)	4 core 35 sq mm Al Conductor	M	250	213	53161
k)	4 core 25 sq mm Al Conductor	M	900	196	175982
l)	4 core 16 sq mm Cu Conductor	M	3200	159	508394
m)	3 core 16 sq mm Cu Conductor	M	690	159	109622
n)	2 core, 16 sq mm Cu Conductor	M	300	120	35930
o)	4 core 10 sq mm Cu Conductor	M	300	537	160951
p)	4 core 6 sq mm Cu Conductor	M	300	308	92391
q)	4 core 4 sq mm Cu Conductor	M	300	263	78825
r)	3 core 10 sq mm Cu Conductor	M	300	332	99723
s)	3 core 6 sq mm Cu Conductor	M	200	282	56461
t)	3 core 4 sq mm Cu Conductor	M	1500	166	249308
u)	2 core 50 sq mm Cu Conductor	M	200	918	183559
v)	3 core 2.5 sq mm Cu Conductor	M	1200	122	146652
2.0	**Fire Survival Cables**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, laying, jointing, terminating, testing and commissioning of 1100 V grade, armoured, **FIRE SURVIVAL CABLE, XLPE, Copper (CU)** conductor cables on existing trays / walls/columns/ indoor including the cost of supports with suitable clamps, saddles, hooks, bolts etc. & in ground/ trenches including the cost of supply and fixing, crimping lugs, double compression weather proof flame proof brass glands, Earthing lugs and shrouds, proper dressing of cables, markers providing identification tags, sand filling etc. (cost of excavation, sand & bricks, included here) earthing of glands armouring etc. complete as per specifications as required and as below.				
	FIRE SURVIVAL cables are manufactured and tested in accordence with BS 7846, IS 7098 (Part-1), IEC 69331 and BS 6387 for required temperatures and duration based on the application and site conditions.				
	4 core 95 sq mm fire survival Cu. conductor cable	M	100	1799	179942
	4 core 35 sq mm Cu. Conductor cable	M	200	781	156106
	4 core 10 sq mm Cu Conductor cable	M	200	387	77406
2.0	**Cable Trays**				
2.1	Supply & installation of perforated hot dipped galvanised double bended cable trays from 2 mm thick GI sheets continuously connected including horizontal and vertical bends, reducers, tees, and other accessories and duly suspended from the ceiling with 12 mm dia vertical GI rods supported by 40mm x 40 mm x 5 mm GI angle etc. (or installed on wall supported on suitable brackets as required) complete as per specifications, as required and as below.				
	Note: Trays shall be supported adequately at minimum 1 m distance from the building structure / ceiling by means of galvanized (as specified) MS structural members secured to the structure by dash fasteners or by grouting. This support should be capable of withstanding the weight equivalent of 3m length of the cables that can be laid in the trays. At turns the support has to be double and at both ends of the bend.				
a)	600 mm wide x 50 mm deep	M	60	1393	83592
b)	450 mm wide x 50 mm deep	M	225	1220	274423
c)	300 mm wide x 50 mm deep	M	680	869	590861
d)	150 mm wide x 50mm deep	M	900	599	538946
2.2	Supply, fabrication & installation of hot dipped GI cable ladders continuously connected with suitable size runners horizontal and vertical bends reducers, tees, cross members and suspenders and other accessories and duly suspended from the ceiling with GI suspenders etc. complete as per specifications, as required. **(Note:** where required this item shall also be used making cable cum luminaire fixing tray and for fixing bus trunking to the surface along with associated fixtures, fasteners and other fixing members as approved by employers representative in advance for this purpose.)	Kg	3200	138	441911

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Note : GI suspenders and necessary anchor fasteners or any other fabricated G.I. item of any size as approved is included in this item and shall not be paid separately				
2.3	Supply, installation and testing of sheet steel raceways in floor, fabricated from 2.0 mm thick GI with minimum coating thickness 260 gm / sq. meter on both sides with removable cover plate complete with counter sunk cadmium plated brass screws, bends, tee-junctions, cross junction etc. rendered electrially continous as approved and of following sizes				
2.3.1	200 mm wide & 50 mm deep	M	90	1008	90741
2.3.2	100 mm wide & 50 mm deep	M	60	649	38936
3.0	**Bus Trunking**				
3.3	Supply, installation & testing of 25 A, Copper, Lighting Bus Trunking System in easy detachable and conveninet assembly suitable for 415 +-10% Volts, 3 Phase+ Single Phase, 8 Wire, 50 Hz A C System with Cu Bus Conductors of minimum 2.5 sq mm section and stainless steel / hot galvanised steel enclosure, with tap off provision every 0.5 mtr. The Lighting Bus Trunking shall be confirming to latest IEC Standards. It shall be with IP-55 Protection, halogen free and Fault Level Withstand Capacity of 2.5 kA min for 0.1 Sec (Icw) and 9.6 kA (Ipk). The Bus Trunking shall be complete with accessies like supporting clamps for Installation at Site, Fixing Clamps for lumanaries and cable & one run of Cu earthing of 25x3 sqmm. equal to phase etc as required.				
a	Straight Feeder with End feed, Cover with flexible Joint 25 A	RM	440	8437	3712446
b	10/16 A Single Phase Tap Off Boxes with fuse and indication.	RM	224	648	145088
	TOTAL FOR E.03				**10613461**
E.04	**CONDUIT WIRING**				
1.1	Supply & laying of conduit and wiring for the following light / Ceiling Fan/ Exhaust Fan / Bracket fan point with 3 x 2.5 sq. mm, 1100 Volt grade PVC insulated FRLS copper condutor wires in heavy gauge GI conduit surface run with GI saddles, or concealed or in GI raceway including chases and complete with GI junction boxes, pull boxes, inspection boxes,bends & other accessories etc. including insulated Protective Earth (PE) Conductor and earthing of switch boxes excluding the cost of switches/sockets and switch boxes.as specified and as under:				
a)	First point controlled by one 6A **switch** / 10A MCB	No.	140	3803	532445
1.2	Secondary or looping points wiring as specified in 1.1 above using 3x2.5 copper (P+N+PE) wires in 25 dia GI conduit for lights, fans, socket outletsincluding providing terminal block, ceiling rose & other accessories etc as required (exlcuding the cost of switches, sockets & switch boxes) as per specifications and drawings as required	No.	500	2013	1006399
1.3	Supply & laying of wiring for the following light point with 3 core x 2.5 sq. mm, 1100 Volt grade PVC insulated FR copper condutor flexible cabe in existing raceway or existing heavy gauge GI conduit surface run with GI saddles, or concealed or in MS raceway including chases and complete with GI junction boxes, pull boxes, inspection boxes,bends & other accessories etc. including insulated Protective Earth (PE) Conductor and earthing excluding the cost of MCB as specified and as under:	No.	1000	142	142000
a)	One point controlled by 10A **MCB**.	No.	114	3177	362230

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.4	Secondary or looping points wiring as specified in 1.3 above using 3 core x 2.5 sq. mm insulated copper (P+N+PE) flexible cable in existing MS raceway for lights on Platform outlets including providing terminal block, ceiling rose & other accessories etc as required (exlcuding the cost of switches, sockets & switch boxes) as per specifications and drawings as required	No.	356	1272	452905
1.5	Supply & laying of conduit and wiring for the following 16A socket outlet point with 3 x 6 sq. mm, 1100 Volt grade PVC insulated FR copper condutor wires in heavy gauge GI conduit surface run with GI saddles.				
a)	One no. 16A socket outlet point controlled by one 16A switch.	No.	80	8010	640771
1.6	Secondary or looping 16A socket outlet points wiring as specified in 1.5 above using 3 x 4 sq. mm copper (P+N+PE) wires in 25 dia GI conduit for socket outletsincluding providing terminal block, ceiling rose & other accessories etc as required (exlcuding the cost of switches, sockets & switch boxes) as per specifications and drawings as required	No.	80	4763	381002
	NOTE :-				
	With regard to Item Nos. 1.1 to 1.6, for further clarifications, the sample measurement system to be followed is given below :-				
a)	In case of 10 nos. light fixtures looped together and controlled directly from one no. MCB in DB, quantity to be paid shall be 1 No. as per Item No. 1.1 or 1.3 as applicable and quantity to be paid shall be 9 Nos. as per item no. 1.2 or 1.4 as applicable.				
b)	In case of 5 nos. light fixtures looped together and controlled from switch located in a room, quantity to be paid shall be 1 no. as per Item No. 1.1 and quantity to be paid shall be 4 Nos. as per item no. 1.2. Conduit & wire laid from MCB in DB to first light point via switch point shall not be paid separately and is included in the rate in item no. 1.1. Same shall be the case for item nos. 1.5 & 1.6 as applicable.				
2.0	Supply& installation of following modular grid plat mounted switch/es and socket/s etc. on a suitable size mild steel electrogalvanised switch boxes complete in single or combination on prorata basis complete with the connections, earthing and testing as per specifications and as required:(Note the grid plate and MS BOX shall be selected suitably as per the requirement to fix the switches and sockets.				
2.1	1 no. 6A modular switch	Each	300	171	51328
2.2	1 no. 6A switch & 1 # 6A socket	Each	80	287	22931
2.3	1 no. 6A socket	Each	50	206	10277
2.4	6/16 Amp Universal socket with 16 amp modular switch	Each	62	322	19976
2.5	32A 3 pin industrial socket outlet with 32 A DP RCCB 30mA with MCB shall be of standard powder coated MS steel IP-55 enclosure, separately lockable.	Each	9	11009	99078
2.6	Supplying installation testing and commissioning of Industrial Socket with 10/25/32A DP MCB in IP 54 rated surface/recessed box with the total unit having IP 54 ingress protection with incoming & outgoing cable box for AC indoor unit complete as required.	No.	1	5386	5386
2.7	Supplying installation testing and commissioning of 63A TP Isolator with powder coated MS box in IP 55 rated surface/recessed box with the total unit having IP 55 ingress protection with incoming & outgoing cable box for AC outdoor unit complete as required.	No.	5	11682	58411
2.8	Supplying installation testing and commissioning of 5A DP Isolator with powder coated MS box in IP 55 rated surface/recessed box with the total unit having IP 55 ingress protection with incoming & outgoing cable box for AC indoor unit complete as required.	No.	25	1281	32025

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3	Supply and installation of GI conduiting complete with GI junction and pull boxes, GI fish wires as specified and as shown below.				
3.1	25 mm dia 1.6mm thick	M	2500	150	374963
3.2	32 mm dia 1.6mm thick	M	300	219	65660
3.3	50 mm dia 2.0mm thick	M	50	393	19665
4	Supply, installation & testing of sheet steel raceways suspended from ceiling, as per details, fabricated from 2mm thick MS sheet with rust free treatment and painted as per approved shade with removable cover plate complete with counter sunk screws, bends, teejunctions, crossjunction etc, rendered electrically continous having side opening hinged cover as approved and of following sizes :-				
4.1	100mm wide and 75mm deep	M	1	800	800
4.2	Supply, installation, and testing of 3-compartment raceway of approximate size 275mm (W) x 75mm (H) fabricated from 2 mm thick galvanized steel, treated for rust free & anti-corrosion treatment, with minimum coating as per relevant I.S., and painted as per approved shade. The raceway shall be provided with openable hinged cover (s) and in 2.5m to 3.0 meter pieces. The overhead raceway is provided to fix the Light Fittings continuously on the platforms.	M	380	1549	588519
	Note: The rate is inclusive of all fixing arrangement, steel parts, welding work etc. required to suspend the raceway to platform steel structure. Contractor shall get the drawing / design of raceway approved from the Engineer before bulk fabrication.				
5	Supply & installation of 75mm x 75mm x 50mm deep G.I box,1.6 mm thick for Data & Telephone.	Nos.	1	82	82
	TOTAL FOR E.04				**4866853**
E.05	**INDOOR LIGHTING AND FANS**				
1.0	Supply, installation, testing & commissioning of light fittings including all accessories e.g. ballast, HPF condensors, lamps, holders, surface/recess mounting arrangement etc. including necessary supports, accessories and hardware as per specifications & as required at site and as below:				
A	**Luminaire minimum specifications and requirements**				
a)	Luminaires should operate at +/- 6% voltage fluctuation for continuous use to comply to IEC. PF > 0.95 for HF ballasts; for EM circuits PF > 0.85 with capacitor.				
b)	All the components including the internal wiring of the luminaries to be used shall be manufactured of material, which are of FR type. All luminaires shall be manufactured to relevant sections of IEC60598 or other approved international standards and the type tests for all luminaries shall be provided.				
c)	All internal wiring within the lighting fixtures shall be heat-resisting cables.				
	Note: Lamp should have free replacement for one year from the date of Installation. The Date of installation shall be from the date of handing over the work to Client.				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.01	Supply, Installation, Testing & commissioning of surface/suspended 4 ft LED luminaire. The housing shall be made of extruded aluminium with a CRCA front frame and high efficiency opal diffuser with approximately 87% transmitivity. System level lumen package shall be > 3275 lumens with system wattage of 54W providing a luminaire efficacy of >60 lm/W. It has a constant current electronic gear with PF>0.9 and THD<25%. The system level lifetime is around 50,000 burning hours with 70% percent lumen maintenance. The luminaire is IP 20 protected. Similar to Philips Sereno LED RC869B LED 30S-6500 PSE W30L120 D8 GR or superior as per approved list. (TYPE-A PUBLIC AREA, Platform area, ASS ROOM, MESH ROOM, SECUIRITY ROOM,EL UPS ROOM,CORRIDOR, STORE, PD AREA)				
a)	Supply of above given items	No	1597	4737	7564765
b)	installation, testing, commissioning of above given items	No	1597	249	398146
1.02	Supply, Installation, Testing & commissioning of 4' LED luminaire similar to Philips LED trunking or equivalent as per approved make of list. Luminaire should be suitable for surface mounting / suspended, The housing shall be made of extruded aluminium and CRCA front frame with polycorbonate diffuser cover. The product should be suitable for direct installation on RCC with accessories with option of being suspended. (TYPE-B, Platform Edgeside)				
a)	Supply of above given items	Nos.	81	4160	336926
b)	installation, testing, commissioning of above given items	Nos.	81	219	17737
1.03	Supply, Installation, Testing & commissioning of 15W Surface mounted LED downlighter having a lumen output of 950lumens at 6500 Color Temperature and CRI >75. the fixture is made of Die Cast Aluminium. Specified as Philips GreenLED Surface DN170C 1XDLED - 6500 PSU WH and supplied with same as required.(TYPE-C, TOILET ROOM)				
a)	Supply of above given items	No	65	3231	210001
b)	installation, testing, commissioning of above given items	No	65	170	11056
1.04	Supply, Installation, Testing & commissioning of 10W LED Bulkhead with a lumen package of 600 lumens in Cool White color. The fixture has a THD ≤ 20% and PF > 0.9 . Fixture is protected to IP 66 and IK 09 . Fixture has a housing of High pressure die cast aluminum and a front diffuser of Poly carbonate. Specified as Philips Endura LED WT202W LED6S CW PSU S1 PC and supplied with same as required.(Type-D, LIFT AND SHAFT AREA)				
a)	Supply of above given items	No	1	11763	11763
b)	installation, testing, commissioning of above given items	No	1	619	619
1.05	Supply, Installation, Testing & commissioning of LED 2X2 recess mounting luminaire with Mid flux LED using efficient optics enclosed in a Metallic CRCA powder coated housing with high efficieny Lumio diffuser. It should be system lumen efficacy > 80Lumen/Watt with system level luminous flux of 3100 lumens and system wattage of 40W . 50,000 hours burning life for the system at 70% lumen maintenance with a Color rendering index > 80 and Color temperature 6500K.PF > 0.9 and THD<33%. Luminaire must be sealed from bottom and has an inbuilt gear. The luminaire should be IP 20 protected. Similar to Philips Fullglow RC380B LED-30-4000 PSE OD WH or superior as per approved list. (Type-E, SCR, TOM, EFO)				
a)	Supply of above given items	No	28	6408	179415
b)	installation, testing, commissioning of above given items	No	28	337	9444
1.06	Supply, Installation, Testing & commissioning of 80 W LED High Bay with a system lumen output of >7300 lumens at 5700 color Temperature. The fixture is made of High Pressure Die Cast Aluminium and is protected to IP 65. Fixture has a high efficacy of 91 lm/W, a CRI > 70, PF > 0.9 and a THD < 20%. The fixture has a symmetric wide optics. Similar to philips Greenbay BY400V LED 70S CW SK PSU S1 FG WH or equivalent as per approved list.(TYPE-F, TERRACE AREA)				
a)	Supply of above given items	No	1	12767	12767

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b)	installation, testing, commissioning of above given items	No	1	672	672
2	**Bracket Fans**				
2.1	Supply and installations of 230 V, 1-phase, 1440 RPM, sweep of appx. 400mm Bracket fan including mounting bracket, blades, starters & other standard accessories complete as required.	No.	15	2863	42946
3	Supplying and installations of 230 V single phase, 1400 mm sweep ceiling fans with electronic regulators including all standard accessories complete, mounting of regulator on grid plate & MS BOX etc. and suitable length down rod, duly painted, not exceeding minimum fan height of 2.4 m from floor as required and as below.	No.	5	1782	8910
	TOTAL FOR E.05				**8805168**
E.06	**PROTECTIVE EARTHING**				
1	**50X6mm copper flat for Earth Mat @ ASS -1 Building**				
1.1	Supply, laying, testing and commissioning of 50X6mm copper flat for earth mat (at 700 mm to 3000 mm deep as per approved drawing & calculations) as per specifications including lap (of not less than 150 mm) & cross weld joints and providing bitumin coat at every joint as required. Earthing risers from earth mat to be brought out as per approved drawings and specifications wherever required.	RMT	350	615	215423
2	**30 mm dia Copper Rod for Vertical Electrodes**	No.	20	2052	41040
2.1	Supply, laying, testing and commissioning of 30 mm dia copper rod, laying of vertical earth electrodes 3 m deep from earth mat including weld joints with earth mat as per approved drawings and specifications. The weld joints to be provided with bitumin coats.				
3	**Extra for Bituminous Coating and Hessian Tape Wrap**	M	300	36	10666
3.1	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried earthing strips risers mentioned above in item 1.1 as per specifications and drawings as required.				
2	**MAINTENANCE FREE EARTHING**				
2.1	**Maintetance free earthing-**				
	Supply, installation and testing of copper bonded (25mmX 3Mtr) electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover	NOS	6	6119	36714
3	**EARTHING STRIPS & CABLES**				
3.1	**Strips for Interconnecting the Earthing Stations, Panels, DBs etc**				
4	Supply and laying,Testing and commissioning of copper/GI Strips/wire for interconnecting the earthing stations ,panels,DBs etc. of the following sizes in built up trenches /surface/wall/ground complete with holes & fixing,jointing / terminating accessories as per specifications & drawing as required. (Quantity shall be paid as per the actual measurement as executed, however direct measurement shall not excced the quantity indicated in drawing approved .				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.1	75 mm x 6 mm GI strip	M	1	383	383
3.2	50 mm x 6 mm GI strip	M	2070	288	597020
3.3	25 mm X 6 mm GI strip	M	6325	165	1043521
3.4	20 mm X 3 mm GI strip	M	1	109	109
3.5	8 SWG WIRE	M	173	31	5286
3.6	70Sqmm single core Copper cable for clean earthing	M	150	251	37663
	Note-1: In case of non availability of any of the sizes mentioned above, next higher size available in market shall be provided at the same rate.				
	Note-2: No additional payment will be made for providing Main Earth Terminals (made out of GI/Cu strips from within the above sizes). The METs will required to be fixed on walls as required and will be required to be provided with 12/16/20mm holes for connections of individual equipments including of other contractors'.				
4	Extra for bituminous coating and hessian tape wrap or polyethylene faced hessian complete for buried 50mm x 6mm or 75mm x 6mm strip as per specifications and drawings as required	M	920	70	64087
5	Extra for GI / Electrolytic Copper test links/ termination With building pier continuity Conductor including termination plate, nut& bolts,fixing/welding etc as per specifications and as required.	No.	30	2280	68413
	TOTAL FOR E.06				**2120324**
E.07	**LIGHTNING PROTECTION**				
	Lightning Conductor Finials				
1.0	Supply and fixing Lightning Conductor Finials made of 25 mm dia 1mtr long copper tube having a single prong at the top with 85 mm dia 6 mm thick copper base plate, fixing accessories and clamping with down conductor as per specifications complete as required.	No.	10	2278	22780
2.0	**Stainless Steel horizontal & Vertical Conductor**				
	Supply, laying and fixing of the stainless stell horizontal & vertical conductor of following sizes on surface/wall/parapet/shaft complete with joints, bimetallic connectors, testing links & other fixing accessories and clamping/ connection with earth terminations as per specifications & drawing as required.				
2.1	25X6 mm thick SS Strip	M	1800	149	268200
3	**Testing Joints**	M	40	854	34160
	Supply and fixing of the testing joints made of 50 mm x 6 mm thick SS strip 125 mm long with 4 Nos. SS bolts, nuts, check nuts and spring washers complete as required.				
4	**Maintetance free earthing-**	M	10	6119	61190

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, installation and testing of copper bonded (25mmX 3Mtr)electrode chemical earth pit with hygroscopic condactive compound + soil conditioning gel including chamber with cover				
5	**Air Craft Warning Lights**	M	2	10223	20446
	Supply, installation, testing & commissioning of air craft warning lights complete with non flickering type lights similar to GEC model ZH 752 or WIPRO model no. WAN 20001 or equivalent including lamps, mounting bracket, earthing, painting complete with accessories to automatically switch off lights. (Point wiring shall be done under subhead conduit wiring).				
	TOTAL FOR E.07				**406776**
E.08	**UNINTERRUPTED POWER SUPPLY SYSTEM**				
	Supply, Installation, Testing and Commissioning of **following rating online, UPS** system suitable for providing power supply to emergency lighting and Computerised Control panel load of approved make, suitable for incoming 415 volts, 3 phase +10 % - 20%, 50 Hz, supply and three phase output voltage, variation ± 1%, including transformer, rectifier/dual converter, static switch, inverter, filter, Bypass & static transfer switch for automatic switch over without giving any break of power, maintenance bypass switch, Micro processor/ software controlled annunciation,protection(including against input phase reversal), and menu run diagnostic module,associated cabling and connections/ terminations, erection including associated foundation/ masonorey or RCC work for mounting on base channels etc. complete as per specifications and as required.				
	The UPS shall be a true parallel redundant with bypass with Individual Battery Bank on each UPS for 30 minutes (2X100% Redundancy on Battery Setup)				
8.1	2 X 70KVA UPS (PR System)	No	1	1508345	1508345
8.2	Supply, Installation, Testing and Commissioning of 2V SMF VRLA lead acid sealed maintenance free battery (Design Life - 10years) suitable for 30 minutes backup to the UPS set. Battery shall comply with relevant regulations & Battery racks shall be made of acid resistant material. (70KVA UPS)	Set	1	4109009	4109009
	TOTAL FOR E.08				**5617354**
E.09	**DG SET WITH PLC BASED AMF LOGIC PANEL**				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
A	Supplying, installation, testing & commissionin of Radiator Cooled type Diesel Generating Set comprising of multicylinder diesel oil engine with radiator, fly wheel, exhaust piping upto silencer, residential type silencer, electric starting equipments, batteries, battery charger, directly coupled to an alternator of suitable capacity at 0.8 P.F. 3 phase, 4 wire 50 Hz 415 volts, A.C supply complete with brass plate antivibration mountings foundations for installation of D.G. Set,terminating arrangement for outgoing cables, control panel,controlling MCCB etc, complete of exhaust pipe installation with support arrangement as required as per specifications, Drawings and specified ambient conditions				
	DG Sets shall be suitable for Auto Start, Auto Stop and Auto Load Management.				
	500 KVA D.G. set with canopy	Set	1	4609317	4609317
B	Supply, erection, testing and commissioning of floor mounted totally enclosed sheet steel AMF Panel with PLC suitable for automatic operation of 500 **k**VA DG set and equipped with automatic gas flooding using linear heat sensing tube type fire trace system or equivalent. The panel shall be suitable for 415 V, 3 phase, 4 wire system, **Copper bus bars** designation labels as per requirement, continuous earth bus, cable clamping supports, panel illuminating lamps, cable gland plates for incoming and outgoing feeders as per details below :	Set	1	69714	69714
(a)	INCOMING 1 nos. 1000 A, 50 kA, 4-pole ACB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable				
(b)	**OUTGOING**				
	1no. 630 A, 50 kA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable. (For Main Distribution panel).				
	1no. 400 A, 50 kA, 4-pole MCCB with microprocessor based over load and short circuit protection with time delay and earth fault IDMT release - all site settable. (For Main Distribution panel).				
(c)	1 No., 230V, AC operated integrated type Digital Multi function meter for measuring Frequency, Amperes ,Voltage, Energy & Power factor of appproved makes conforming to specifications, latest IEC/ EMC and EMI standards, with necessary Circuit MCBs and suitable size CTs for above two incomer metering supporting SCADA / BMS connectivity				
(d)	One set of ***"Battery charger"*** consisting of :				
(i)	Transformer/Rectifier				
(ii)	DC. Ammeter				
(iii)	DC. Voltmeter				
(iv)	Charging rate selector switch (OFF/Trickle/Boost.)				

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
(e)	One Mains supply Voltage monitor				
(f)	One set of DC Control relays incorporating engine Start/Stop, three attempts starting facility and failure to start lock out.				
(g)	One set of auxiliary relays for automatic closing and opening of the alternator contactor for automatic operation as required.				
(h)	6 nos. potential free contacts for BMS				
(I)	One selector switch Auto/Manual/ Test				
(j)	One set of the following :				
(i)	One Selector switch for engine control OFF/ON				
(ii)	Four Push buttons, Start, Stop, Reset, Test.				
(iii)	Two Indicating lamps "Load on set" "Load on Mains".				
(iv)	Five Indication on annunciator for shutdown for "Low lube oil pressure", "High water Temperature", "overspeed", "low fuel" & "set fails to starts".				
(k)	One counter to indicate number of times set has operated.				
(l)	One **Hour meter** to indicate the number of hours set has operated				
(m)	The AMF panel shall include necessary internal wiring, control circuit fuses, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required				
(n)	Power Pack for the PLC backup of the DG set with all arrangement, including battary, Control Circuits, Internal wiring, labeling, name plates cable identity tags on both ends etc. complete as per specification and as required				
C	**FUEL SYSTEM**	Lum	1		
a	Supplying, installation, testing and commissioning of heavy duty Hand cranking oil pump with 3 mtr. Long flexible oil hose.	Nos	2		
b	Supplying, installation, testing and commissioning of 990 Day Oil fuel steel tank of under mentioned capacities made out of 5 mm thick M.S. sheet with float valve and low level alarm arrangement including fuel oil piping up to the set valves etc. complete as required.	Nos	2		
c	Supplying, installation, testing and commissioning of Suitable rating Fuel Oil pump including foundations, piping, valves, indications, safety devices etc. complete as required.(Crompton / GE / Kirloskar make)	Nos	2	555500	555500

(Attachment No-6 to Addendum No-1) PART-D - 'SCHEDULE OF QUANTITIES -STATION - LT					
S.No.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
d	MS C class 25mm fuel pipe	Mtrs	Lum		
e	Ball Valve 25mm	Nos	2		
	The Contractor scope of inspection and approval for getting the layout drawing, installation, license from Electrical Inspectorate local authority, explosive department,HERC for Campus complete as required for satisfatory function of the installation of above DG Sets				
	The contractor shall submit back-pressure calculations in support of exhaust pipe size for each DG Set.				
	TOTAL FOR E.09				**5234531**

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.01.A	**FIRE DETECTION & ALARM SYSTEM**				
1	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-criteria detectors below false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	No.	110	1,555	171,094
2	Supply, installation, testing and commissioning of plug-in type addressable analogue multi-criteria detectors above false ceiling including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	No.	30	1,555	46,662
3	Supply, installation, testing and commissioning of plug-in type rate of rise cum fixed temperature addressable analogue Heat detectors including the cost of base plate, 75 mm dia M.S. outlet box for fixing of the detector base, mounting accessories etc. complete as per specifications and as required.	No.	10	1,444	14,443

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4	Supply, installation, testing and commissioning of "2" Loop (750 Detectors, 400 Devices) (Fire Alarm Capability: 1 Loop x 99//125/150 detectors/ devices) wall recess mounting microprocessor based analogue addressable Fire Control Panel expandable by minimum 2 additional loops (Fire loop shall be closed type) with minimum 80 character LCD display, 4 access levels, 1000 events historical logging, flash E-PROM, 240 volts ac power supply, automatic battery charger, 24V SLA batteries suitable for operating the entire system including the talk back units and the hooters/strobes for a minimum of 4 hours in battery condition. The Panel shall have suitable power amplifiers for hooter/strobes. The Panel shall be capable of being Integrated with the BMS System and shall include cost of supply and installation of any additional modules or interfaces required for the same. The panel shall be complete of being Integrated with the BMS System and shall include cost of supply and installation of any additional modules or interfaces required for the same.The pannel shall be complete as per specifications and as required.	No.	1	83,325	83,325
5	Supply, installation, testing and commissioning of Repeater panel including the cost of mounting accessories complete as per specifications and as required	No.	1	55,550	55,550
6	Supply installation testing and commissioning of dust and vermin proof addressable analogue Manual Call Boxes to initiate audio visual alarm including the cost of mounting accessories complete as per specifications and as required.	No.	18	2,333	41,996

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
7	Supply installation testing and commissioning of addressable analogue Talk Back jacks with face plates for Fireman's Handsets to initiate audio conversation with Main Fire Alarm Panel including the cost of mounting accessories complete as per specifications and as required.	No.	6	6,374	38,247
8	Supply, installation, testing and commissioning of Wall/ Ceiling mounting strobes for visual indication including the cost of mounting accessories complete as per specifications and as required.	No.	18	1,222	21,998
9	Supply, installation, testing and commissioning of Control Modules including the cost of mounting accessories complete as per specifications and as required.	No.	18	2,333	41,996
10	Supply, installation, testing and commissioning of Monitor Modules including the cost of mounting accessories complete as per specifications and as required.	No.	15	2,333	34,997
11	Supply, installation, testing and commissioning of Fault Isolator Modules including the cost of mounting accessories complete as per specifications and complete as required.	No.	15	2,111	31,664

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
12	Supply installation testing and commissioning of two way Talk Back handsets to initiate audio interface complete as required.	No.	4	13,970	55,879
13	Supply, installation, testing and commissioning of wall or ceiling mounted 240 Volt AC illuminated double sided pictorial exit signs provided with appropriate direction arrow painted in green on white with an 11W CFL Lamp including the cost of in-built rechargeable batteries with charger suitable for 90 minute operation and including the cost of accessories for surface/ recessed or ceiling suspended mounting complete as required.	No.	16	7,658	122,523
14	Supply, installation, testing and commissioning of Response Indicator Lamp assembly in a dust tight sheet steel enclosure as per detailed specifications including accessories for recess mounting as per approved sample as required.	No.	20	244	4,888
15	Supplying, Laying, Termination, Testing and commissioning of size **2C x 1.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	3,100	72	223,867

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
16	Supplying, Laying, Termination, Testing and commissioning of size **2C x 2.5** sq mm twisted pair Screened Fire Survival cables complying with BS 7846 catagory CWZ.	Mtrs.	3,100	79	244,531
17	Supplying, installing, testing and commissioning of following sizes 16 gauge GI conduits recessed/surface as required including clamps, hardwares etc required for conduiting arrangement complete as per specifications. (Quoted price shall include GI flexible conduits to connect from ceiling to false ceiling)			-	-
a)	20 mm dia	Mtr.	100	149	14,910
b)	25 mm dia	Mtr.	2,200	171	376,407
	TOTAL FOR F.01 A				1,624,975
F.02	**FIRE HYDRANT SYSTEM**				
1	Supply, installation testing and commissioning of fire pumps, electrically driven generally as specified and shown in equipment schedule complete with:				
i)	all accessories				
ii)	vibration mounts				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
iii)	test connection excluding starter panel				
iv)	The pump heads specified on the Drawings and / or Equipment Schedules are for guidance and information only and are calculated based on assumed equipment pressure drops. The exact pump head based on the pipe run and the offered equipment shall be carefully checked and re-calculated for each pump before ordering the equipment. Calculation shall be submitted for approval. No modification to the piping system shall be allowed without prior approval. Any additional cost for the modification of the system (pumps, motors, switchgears, cables, panel boards, switchboards, etc.) necessary to meet the specified duties, special conditions and the offered equipment shall be provided at no extra cost to the Employer.				
1.1	**Hydrant & Sprinkler Fire Pumps**				
	Supply, installation, testing and commissioning of electrically driven multistage, single outlet high pressure centrifugal type fire hydrant /sprinkler pump, suitable for automatic operation consisting of the following:				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Horizontal multistage, single outlet, **Split casing** centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ AC supply. The installation shall be complete with flexible coupling and coupling guard as required. Fire pump shall have CI casing, CS diffusers, bronze impeller (hard finished and dynamically balanced) and SS (304) shaft with mechanical seal, capable for **delivering 2850 LPM at outlet head of 90 mtrs.** to ensure a minimum pressure of 3.5 Kg/Sqcm at the farthest or topmost hydrant / sprinkler. The installation shall be complete with necessary pressure gauge on delivery side.				
	Squirrel cage induction motor, TEFC type suitable for operation on 415 volts, 3 phase 50 HZ A.C supply, for the above pump with synchronous speed of **1500 RPM,** conforming to IP 55 protection & class F insulation. The motor shall conform to IS 325-1978 (up to date).				
	Common base plate for (a) and (b) from M.S. Channel for required size.	Each	4	411,070	1,644,280
1.2	Supply, installation, testing and commissioning of **Jockey pump** (pressurisation pump) comprising of the following:				
	Vertical centrifugal pump, suitable for operation on 415 volts ± 6%, 3 phase, 50 HZ A.C supply. The installation shall be complete with Flexible coupling and coupling guard, complete as required.				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	The pump casing shall be SS, shaft shall be SS & impeller/ shaft sleeve/casing wearing ring shall be bronze. The pump shall be provided with mechanical seal The system shall be complete with necessary pressure gauge with gun metal shut off cock on delivery side.				
	Squirrel cage induction motor TEFC type for operation on 415 V, 3 phase 50 Hz AC supply for the above pump with a synchronous speed of **2900 RPM** as required.				
	Common base plate for (a) and (b) from M.S. channel as required size.				
	For pump defined above & of duty as follows :				
	Flow : **180 LPM**				
	Head : **90 MTRS**	Each	2	94,435	188,870
1.3	Supply, installation, testing, trial run and commissioning of hydrants all complete as required and as approved				
	Internal hydrants / landing valves generally as specified and all complete with:				
	i) 63mm dia Single headed landing valve IS marked (Stainless steel)				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	ii) First aid hose reel with 25 mm dia, 45 m long Reinforced Rubber Lined (RRL) as per IS 12585 rubber hose, ball valve, piping and 7-8 mm nozzle as required	Set	17	29,168	495,848
	iii) 63 mm synthetic synthetic hoses (UL Listed) with 63 mm instantaneous SS coupling, IS marked- 15 m x 2 lengths with suitable arrangement of connecting the hose pipe with coupling as required.				
	iv) branch pipe and nozzle IS marked (Stainless steel)				
	v) Pressure gauge (SS casing) with stop cock.				
1.4	Supply and installation of Hose Cabinet as per following descriptions :				
	Hose cabinet as approved or as per site conditions with universal locking arrangement. Glazed with 5.5mm clear glass Powder coated Stainless Steel shutter door as appropriate with universal locking arrangement with grill of following sizes and types :				
a	Size 1500 x 1850 in 2 mm thick stainless steel sheet	Set	13	39,994	519,928
b	Size 2100 x 900 in 2 mm thick stainless steel sheet	Set	4	33,646	134,583

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.5	Supplying and fixing of stainless steel hose cabinet of size 900 mm x 600 mm x 450 mm made of 2 mm thick with 6mm thick glazed glass doors including necessary locking arrangement suitable and including with external hydrants valves, with butterfly valve 2 nos 63mm dia synthetic hose pipe 15 m long, 1 no branch S.S. pipe with 4 nos MS angle (40 x 40 x 8) supports grouted in floor and duly coated with post office red external and white internal paint complete in all respects.	Each	2	10,666	21,331
1.6	Supply and Installation of Orific Plate complete as required -80 to150 mm Dia.	Each	11	2,095	23,049
1.7	Providing and fixing standard Fire man AXE with heavy rubber handle as complet.	Each	15	1,848	27,714
1.8	Providing and fixing double flanged flexicion rubber expansion joint with unit control of standard length of a as per manufacturer specs tested to a pressure of 15kg/sqcm including rubber gasket, flanges,nuts ,bolts and washers complete as required.				
1.8.1	80 mm dia	Each	4	6,199	24,798
1.8.2	200 mm dia	Each	8	11,735	93,884
	TOTAL FOR F.02				3,174,284
F.03	**PIPING FOR FIRE FIGHTING SYSTEM**				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.1	Supply, fabricating, laying, testing, painting and commissioning of external piping (UNDERGROUND) generally as specified using heavy class G.I conforming to IS:3589 & IS1239 with all fittings at a depth of 1.0 M all complete with one protection layer of 4mm thick Pypkote or similar				
	i) All pipes and all heavy grade fittings conforming to IS:3589 & IS 1239 together with welded joints, flanges, gaskets, bolts & nuts, washers, fittings, adapter pieces etc.				
3.1.1	200 mm nominal bore	M	10	2,977	29,775
3.1.1	150 mm nominal bore	M	1,800	2,166	3,899,610
3.1.2	100 mm nominal bore	M	20	1,533	30,664
3.1.3	80 mm nominal bore	M	80	1,133	90,658
3.2	Excavation and backfilling as per general profiles and back filling for all kinds of soil.	Cu.m	3,500	122	427,735
3.3	Supply,fixing, testing and commisioning of Butterfly Valves PN 16,with Bronze/Gunmetal seat duly ISI marked with nuts bolts ,washers , Gaskets conforming to IS 13095 of Following size as required .				
3.3.1	250 nominal bore	Each	2	22,776	45,551
3.3.2	200 nominal bore	Each	3	16,332	48,995
3.3.3	150 nominal bore	Each	20	6,555	131,098

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.3.4	100 nominal bore	Each	5	4,555	22,776
3.3.5	80 nominal bore	Each	20	3,555	71,104
3.3.6	65 nominal bore	Each	10	3,222	32,219
3.3.7	Providing , Installation , testing and commisioning of dual plate Non Return valve Confirming to IS :5312 complete with rubber gaskets ,GI bolts ,nuts washers etc as required of 150 mm dia	Each	5	9,777	48,884
3.3.8	Providing , Installation ,testing and commision of dual plate Non Return valve Confirming to IS :5312 complete with rubber gaskets ,GI bolts ,nuts washers etc as required of 80 mm dia	Each	2	5,888	11,777
3.3.9	Providing , Installation ,testing and commision of dual plate Non Return valve Confirming to IS :5312 complete with rubber gaskets ,GI bolts ,nuts washers etc as required of f 65 mm dia	Each	2	3,333	6,666
3.3.10	100 mm dia gun metal / ss Draw Out connection with foot valve for Fire Brigade.	Each	1	7,743	7,743

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
3.3.11	Constructing masonry chamber 90x90x100 cm, inside with 75 class designation brick work in cement mortar 1:5 (1 cement: 5 fine sand) for sluice valve, with C.I. surface box 100mm top diameter, 160mm bottom diameter and 180mm deep (inside) with chained lid and RCC top slab 1:2:4 mix (one cement ratio two coarse sand ratio 4 graded stone aggregate 20mm nominal size) necessary excavation foundation concrete 1:5:10 (one cement ratio 5 fine sand ratio 10 graded stone aggregate 40mm nominal size) and inside plastering with cement morter 1:3 (1 cement ratio 3 coarse sand) 12mm thick finished with the flaoting coat of neat cement complete as per standard design				
	With F.P.S. bricks	Each	2	11,110	22,220
4	**INTERNAL PIPING**				
4.1	Supply, fabrication & laying heavy grade IS marked G.I piping conforming to IS 1239 and IS 3589 complete with G.I fittings, pipe supports, clamps, painting of two coats of red enamel etc. as approved with welded jointing for Wet Riser system.				
4.1.2	25 mm nominal bore	RMT	500	344	172,205
4.1.3	32 mm nominal bore	RMT	250	444	111,100
4.1.4	40 mm nominal bore	RMT	150	500	74,993
4.1.5	50 mm nominal bore	RMT	100	700	69,993
4.1.6	65 mm nominal bore	RMT	50	822	41,107
4.1.7	80 mm nominal bore	RMT	300	1,033	309,969
4.1.8	100 mm nominal bore	RMT	250	1,422	355,520

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4.1.9	150 mm nominal bore	RMT	2,500	2,222	5,555,000
4.1.10	200 mm nominal bore (6 mm wall thickness)	RMT	20	2,722	54,439
4.1.11	250 mm nominal bore (6 mm wall thickness)	RMT	10	3,389	33,886
5	supply, installaiton ,Providing, fixing, testing and commissioning of precharged air vessel (size 450 mm dia & 2000 mm height) for pressurization of hydrant / sprinkler system complete with adequate pressure switches (as per design/requirement) with valves to operate as per operating sequences including 25 mm dia drain valve, air release valve with stop cock on the top, 100 mm dia inlet with isolating valve duly painted from inside and outside complete as required.	Each	1	25,521	25,521
6	Providing and fixing **200 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Each	2	25,886	51,773
7	Providing and fixing 8**0 mm Y TYPE strainer** with bronze perforated sheet basket including rubber gasket, flanges, nuts, bolts and washers, complete as required.	Each	1	7,222	7,222

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
8	Supply, installation, testing and commissioning fire brigade connection with 4 way 63mm valves inlets, stand post and 150 mm G.I. pipe for mounting the stand post etc. as specified all complete as approved . **Note:** The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Each	1	16,998	16,998
9	Supply, installation, testing and commissioning Siamese connection with 4-way 63-mm outlets with non-return valve and butterfly valve etc. complete as required at road level cabinets. **Note:** The drawings of the proposed arrangement shall be provided by the contractor for approval of employer's representative.	Each	2	16,998	33,997
10	Providing & fixing single acting Air release valve with brass gate valve, flanges/ union, suitable for wet riser system with all necessary connections.				
a)	25 mm dia	Each	4	3,673	14,693
11	The rate shall include supply and fixing **Gun metal ball valve** CI hand wheel suitable for pressure 15 Kg/sqcm. and confirming to relevant IS of the following size including providing necessary union/flange and making proper connection for air testing and drainage system.				
11.1	25 to 40 mm nominal bore	Each	3	2,908	8,723

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
11.2	50 mm nominal bore	Each	3	5,666	16,998
	TOTAL FOR F.03				11,881,608
F.04	**SPRINKLER SYSTEM**				
1	Supply, installation, testing and commissioning of 150 mm dia Installation Control Valve inclusive of 1 no. 150 mm dia Butterfly Valve, trainer, Alarm Valve with Water Motor Gong, Pressure Gauges, Test Lines with Ball Valves with necessary GI (H) piping with threaded fittings of required pipe sizes complete. The item also includes providing and fixing 100 mm dia Pressure Gauges on Sprinkler Headers including Ball Valves, Test Control Box, brass strainer, retard chamber.	Set	1	59,499	59,499
2	Providing, fixing, testing and commissioning of UL listed Pendant / Upright type Sprinkler Head rated at 68 degree centigrade	Each	550	333	183,315
3	Providing and fixing sprinkler drain with 25 mm dia ball valve.	Each	1	333	333
4	Providing and fixing UL listed Flow Switch of 80 / 100 / 150 mm dia on Sprinkler Header complete with flexible full bore paddle, U clamp and NO / NC contact terminals	N0	40	5,354	214,179
	TOTAL FOR F.04				457,326

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
F.05	**PORTABLE FIRE EXTINGUISHERS**				
1	Supply and installation of portable fire Extinguishers as described below:				
1.1	9 litre capacity of water CO_2 type, IS marked, with discharge tube including clamps etc.	Each	12	2,019	24,224
1.2	Carbon dioxide extinguisher conforming to relevant IS with high pressure discharge tube, horn, control valve, IS marked including clamps etc.				
	4.5 kg capacity extinguisher	Each	40	4,555	182,204
1.3	Mechanical foam type 9.0 liter capacity fire extinguisher (for DG room)	Each	2	2,176	4,353
1.4	Providing and fixing fire extinguishers water type of Capacity 9 liter with internal plastic fitting and ISI marked as per IS-940 with Gun metal Cap Co2 cartridge and Initial refil.	Each	2	1,889	3,777
1.5	Providing and Fixing Co2 gas type trolley mounted fire extinguisher of capacity 22.5 kg with ISI marked and as Item IS 2878with discharge nozzle and initial refil.	Each	2	14,332	28,664

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.6	Providing and fixing trolley mounted fire extinguisher of capacity 50 liters with IS marked as per IS 13385 or Equivalent Standard with nozzle and Initial refil.	Each	1	6,555	6,555
	TOTAL FOR F.05				249,777
F.06 A	**CLEAN AGENT BASED PANEL FLOODING SYSTEM FOR ELECTRICAL PANELS.**				
1	Supply, fixing, testing and commissioning of UL 521, UL listed Polymer Tube Detection based Clean Agent **Fire Suppression** System for Electrical Panels, consisting of the following components:				
1.1	Direct Low Pressure Clean Agent system **10 LBS** capacity, complete with Clean agent) **(NOVEC 1230 or equivalent)**, D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and:**INCLUDING**	NO.	8	76,659	613,272
1.2	Fill Port				
1.3	Outlet Port				
1.4	End of Line Adaptor				
1.5	Pressure switch				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2.0	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.O make each entire system functional - 2 Nos.	Mtrs.	400	1,055	422,180
3.0	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	NO.	8	15,554	124,432
4	Providing and fixing set of 4 fire buckets capacity 9 ltrs fabricated from 24 gauge MS sheet brackets filled with jamuna sand, two coats of anti corrosive paint inside and outside and two coats of white enamel inside and two coats of postal red enamel outside with " FIRE" marked on each bucket, including M.S. fabricated 4 bucket standard size with 4 hooks. For Hanging buckets including painting with two coats of anti corrosive primer and two coats of postal red enamel on all surfaces of approved quality and make complete in all respects.	No.	8	2,000	15,998
F.03 B	**CLEAN AGENT BASED PANEL FLOODING SYSTEM -FIRE TRACE TUBE SYSTEM**				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	Direct Low Pressure Clean Agent system **5 LBS** capacity, complete with Clean agent **(NOVEC 1230 or equivalent)**, D.O.T/TC approved Cylinder, nickel plated brass valve with slip on union connector, isolation valve, plug pressure switch port and 195 psi Pressure gauge fittings, operating pressure 195 psi (13.45 Bar) at 70 Deg F, supplied complete with Bolt Pattern Bracket and:**INCLUDING**	NO.	8	69,993	559,944
1.1	Fill Port				
1.2	Outlet Port				
1.3	End of Line Adaptor				
1.4	Pressure switch				
2	Flexible 4/6mm UL 521, UL listed Polymer Detection Tube 195 Deg C rated complete with all necessary fittings & supports.o make each entire system functional - 2 Nos.	Mtrs.	400	1,055	422,180
3	System Indication & Control Unit (SICU) integrated panel for indicating the Health and operational status of the system, complete with ports to interface pressure switch, Audio visual Alarm unit, and output to FACP and BMS/ SCADA System including all necessary accessories.	NO.	8	15,554	124,432
	NOTE: The items indicated above are notable items. The vendor to include all allied and implid items in required quantity at no extra cost.				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	TOTAL FOR F.06 A				2,282,438
F.07	**FM 200 FIRE SUPPRESSION SYSTEM**				
A	**SIGNALLING EQUIPMENT ROOM (SER)**				
1	80 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	1	86,269	86,269
2	FM 200 Agent filled in above cylinder (Kgs)	Kgs	69	2,525	174,225
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	45,905	45,905
4	Discharge nozzles	Nos.	1	5,555	5,555
5	Cylinder bracket	Nos.	2	1,111	2,222
6	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191,649	191,649
B	**TELECOM EQUIPMENT ROOM (TER)**				
1	140 Ltr Cylinder/Valve Assembly & Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	1	112,408	112,408

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2	FM 200 Agent filled in above cylinder (Kgs)	Kgs	126	2,525	318,150
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	45,905	45,905
4	Discharge nozzles	Nos.	2	5,555	11,110
5	Cylinder bracket	Nos.	2	1,111	2,222
6	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191,649	191,649
C	**UPS ROOM**				
1	140 Ltr Cylinder/Valve Assembly & Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	1	112,408	112,408
2	FM 200 Agent filled in above cylinder (Kgs)	Kgs	80	2,525	202,000
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	45,905	45,905
4	Discharge nozzles	Nos.	2	5,555	11,110

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
5	Cylinder bracket	Nos.	2	1,111	2,222
6	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191,649	191,649
D	**UPS & EM ROOM**				
1	140 Ltr Cylinder/Valve Assembly & Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	1	112,408	112,408
2	FM 200 Agent filled in above cylinder (Kgs)	Kgs	103	2,525	260,075
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	45,905	45,905
4	Discharge nozzles	Nos.	2	5,555	11,110
5	Cylinder bracket	Nos.	2	1,111	2,222
6	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191,649	191,649
E	**STATION CONTROL ROOM (SCR)**				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	80 Ltr Cylinder/Valve Assembly & Pressure Gauge (CCOE approved) including piping in compliance to the requirements specified in clause no.4.2.1 of NFPA-2001	Nos.	1	86,269	86,269
2	FM 200 Agent filled in above cylinder (Kgs)	Kgs	69	2,525	174,225
3	Master cylinder kit comprising Solenoid actuator, Manual actuator, adapters, discharge hose, warning sign etc.	Nos.	1	45,905	45,905
4	Discharge nozzles	Nos.	1	5,555	5,555
5	Cylinder bracket	Nos.	2	1,111	2,222
6	Gas release Panel including smoke detector ,MCP , Abort switch & Strobe cum sounder	Nos.	1	191,649	191,649
	TOTAL FOR F.07				2,881,752
F.08	**MISCELLANEOUS FIRE SERVICES EQUIPMENT**				
1	Self- contained open circuit type compressed air Breathing apparatus set confirming to EN-137:1993 , standard complete with one spare cylinders,	Set	2	122,210	244,420
1.1	Air cylinder with valve				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.2	Back plate with body harness				
1.3	Face mask				
1.4	Pressure reducer				
1.5	Lung demand valve				
1.6	Pressure gauge & warning whistle				
1.7	Hoses				
1.8	Carrying case				
1.9	Spare air cylinder				
1.10	One wall mounted cabinet to store the above breathing apparatus & associated equipments				
	TOTAL FOR F.08				244,420
F.09	**VESDA SYSTEM FOR SER,TER,UPS ,SCR & UPS & EM ROOM**				

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1	Laser-Based Absolute Smoke Detection system with single inlet aspiration detector for Up to 250 m2 (2500 sq. ft.) coverage; Wide sensitivity range - 0.025%–20% obs/m; 3 alarm levels ; High efficiency aspirator; Clean air barrier optics protection; Easy to replace dual stage filter; 3 Nos of inbuilt potential free relay outputs;supports linear pipe length of 25m or branched pipe up to 30m; supports 10 Nos of EN54 Class A sampling points, AutoLearn for automatic setup of alarm threshold, Referencing & Event log; . Approvals-UL, ULC, FM, ActivFire, VdS, CE , EN54-20. **VESDA Laser Focus Detector with display - VLF 250 (SER,TER,UPS & UPS & EM ROOM)**	Nos.	5	222,488	1,112,439
2	Capilllary sampling point set for sampling from below false ceiling (room) **E700-TA+CSC+CT+SP+SPLR**	Nos.	10	2,788	27,876
3	Power Supply units for VLF detectors - Power supply unit operate on 230 volts AC mains input & provide 24 to 30 volt DC output for powering up the detector, support battery backup in case of AC mains failure & have built in charging circuit for batterys. **VESDA Model - VPS 220E**	Nos.	5	13,736	68,680

(Attachment No-6 to Addendum No-1) PART-D - Station - Fire					
S.N.	**Description**	**Unit**	**Qty.**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
4	Sampling Pipe - Smooth bore UPVC or CPVC or ABS Pipe 25mm Outer Dia & 19 to 21mm Inner Dia with all required bends joints & accesorys (approx qty of pipe)	RM	150	187	28,028
	NOTE-Stand alone VESDA detectors proposed. Necessary hardware, cables required for integration of VESDA with fire alarm panel & Sounders need to be considered seperately BOQ proposed is for covering all the voids and dedicated return air sampling is not considered				
	TOTAL FOR F.09				**1,237,023**

(Attachment No-6 to Addendum No-1) PART-D - VAC WORKS (Basement Ventilation for At Grade Aarey Station)					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
H.04	**Aarey Basement Ventilation And Smoke Extraction (JetVent Fan)**				
a	Design, Supply , Installation & Testing of Basement Ventialtion :				
	Supply, erection, testing & commissioning of high efficiency Vane axial flow fans complete with hot deep galvanized steel casing, backward curve aerofoil impeller for atleast 70% efficiency, motor with Class 'H' insulation for smoke extraction (shall be capable of working at 300 deg. C for two hrs. continuously). The entire fan shall be factory assembled. Each fan & motor assembly shall be suitable for operation on 415 ± 10%V, 50 Hz, 3-ph AC power supply and capable to withstand 300 deg. C temperature for minimum duration of two hrs. The fan shall have to be AMCA certified for performance and sound bearing AMCA seal. Minimum efficiency of the Axial fan should be 70%.The fan should be EN certified and CE labeled or UL listed. The fan noise level cannot exceed 80 dba @ 3 m from the fan in hemispherical surface. The fan supports and fasteners shall have to galvanized. Fan shall have the following parameters:				
	30,000 m3/hr, 15 mm SP, approx. 5.5 KW motor handling	No	16	89,299	1,428,778
	The static requirement needs to be checked after the final installation drawings are ready.				-
	Vane Axial flow fans for the fresh air requirement Lower basement				-

(Attachment No-6 to Addendum No-1) PART-D - VAC WORKS (Basement Ventilation for At Grade Aarey Station)					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, erection, testing & commissioning of high efficiency tube axial flow fans complete with hot deep galvanized steel casing, backward curve aerofoil impeller for maximum efficiency, motor with Class 'F' insulation. The entire fan shall be factory assembled. Each fan & motor assembly shall be suitable for operation on 415 ± 10%V, 50 Hz, 3-ph AC power supply. The fan noise level cannot exceed 80 dba @ 3 m from the fan in hemispherical surface. The fan supports and fasteners shall have to galvanized. The fan shall have to be AMCA certified for performance and sound bearing AMCA seal. Minimum efficiency of the Axial fan should be 70%.Fan shall have the following parameters:				-
	30,000 m3/hr, 15 mm SP, approx. 3.7 KW motor handling	No	8	77,508	620,063
	The static requirement needs to be checked after the final installation drawings are ready.				-
					-
	Impulse Jet Fans				-
	Supply, erection, testing & commissioning of jet fan as per specification suitable for normal ventilation & smoke extraction application. Minimum diameter of jet fan shall be 350 mm. Each fan shall be complete with motor & impeller. Unit shall be complete with silencer at suction & delivery side. The entire unit shall be factory assembled. Complete fan assembly shall be certified as "Tested for 300 deg. C for two hrs. operation". The motor shall be suitable for operation on 415 ± 10%V, 50 Hz, 3-ph air supply. The fan shall operate at dual speed deliverying at least 10 N at low speed and 40 N at the higher speed.	No	16	46,148	738,368
	Carbon Monoxide Sensors				-

(Attachment No-6 to Addendum No-1) PART-D - VAC WORKS (Basement Ventilation for At Grade Aarey Station)					
Sl.No	**Item Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, erection, testing & commissioning of CO sensors for sensing carbon momoxide in basement-1 and basement-2. The sensors shall operate within the measuring range of 0-300 ppm CO, IP 44 protected housing, electro-chemical sensor cell, proportional output, 2-wire loop current connection. Response time shall not be more than 90 secs. Sensor cell shall be filled replacable plug in type. The unit shall be capable of working during fire also and capable of operation in 24V DC/AC power supply.	NO	8	12,625	101,000
	Supply, erection, testing & commissioning of CFD analysis for optimal locations, number & configuration of jet fans for design of ductless ventilation system for car parking area in the basement.	1 Set	1	50,500	50,500
	TOTAL				**2,938,710**

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION BMS					
S.N.	**Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
C	**BUILDING MANAGEMENT SYSTEM (BMS)**				
1	**Workstation in Station Control Room (SCR) Aarey Station**				
1.1	BMS Workstation shall comprise of the following minimum hardware: Intel Dual Core 3.2 GHz processor, 4 GB of RAM, Dual Screen 22" LED Color Display, 108 Keys - Keyboard, Optical Scrolling Mouse and Pad, 500 GB HDD 2 SATA Hard Disk Drive DVRCombo Drive, Built in dual gigabit port RAID controller, Graphics Card – Nvidia Quadro K6000 graphics or equivalent for High Quality BMS Graphics, Removable storage device (DVD - Read/ Write), Minimum 8 X Speed. 2 Nos. USB 2.0 port, 1 Centronic parallel port Minimum 4 USB port, 2parallel Port, 2 Serial Port, Dual LAN Card, License copy of MS office & antivirus software and with all the required software SQL server Fully Redundant Power Supply & Fan Unit	No	1	156,680	156,680.29
2	**BMS Equipment & Local/Distributed IO's**				
2.1	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (PLC) - UL LISTED** SITC of Programmable and Application specific 32 bit, Supplyig, Installing, Testing & Commisioning of Programmable Logic Controllers with following specifications 1) Two identically- configured PLC processors are connected in a "Hot Standby" arrangement as "Master" and "Standby" so that when a component of the Master PLC fails, the standby PLC will take over automatically without interrupting the plant operation. 2) 32 bit CPU module with Ethernet Port for Programming / SCADA applications 3) Program Execution watching 4) Built-in hardware real-time clock 5) Semi conductor memory 6) Input supply 240V 7) Power consumption not more than 5kVA 8) CPU Processor module with Ethernet Port for Programming / SCADA applications The PLCs will be able to continuously operate under the following environment conditions a) Operating temperature: 0 to 40 deg. C b) Relative humidity: upto 95% All the PLCs and allied equipments shall be supplied, installed and commisioned with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification- with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification-BMS Systems. The CPU shall have the following key features - a) Industrial type and 2 identical CPU's b) RS 485 port c) Separate Hard disk (Internal Memory) for individual CPU's All PLC Controller input modules served equipment from outside are protected against voltage transients. All input/output modules are galvanically separated from CPU & internal bus. It is protected against short circuit and it is connected via separate terminal strip. PLCs shall be designed by taking 30% of spares in I/O's signals with Mounting cabinet. The PLC shall be designed to handle the IOs in accordance with the IO signals given below.	LOT	1	7,033,164	7,033,164.29

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION BMS					
S.N.	**Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
2.2	The same shall be consdered as a cumulative no of IOs as per the RIOs detailed below PLC for Station - Supply, Testing and Commissioning of Redundant Remote Input Output modules including IO racks compatible for communication protocols like (Modbus, Profibus, Ethernet, TCP-IP etc.,) with PLC's or Operating System. It shall be of communicating all station I/O's with the LSC. It should be supplied with wheather proof tight enclosure and shall comply to intrinsically safe if used in Hazardous area. Shall be of IP 55 and RIO cubicle shall be mounted on the base frame made of galvanised sheet channel with a minimum height of 100mm. The RIO's will be able to continuously operate under the following environment conditions. a) Operating Temperature: 0 to 40 deg. C b) Relative Humidity: upto 95% All the RIOs, allied equipments including interconnections shall be supplied, installed, tested and commisioned with metal enclosure complying to the Electro - Magnetic Compatibility as per the Technical Specification - BMS Systems, Analogue Input, Analogue Output, Digital Input, Digital Output, Soft IO, etc. shall accomodate complete integration upto 600 points				
3	**LASER PRINTER**				
3.1	A hard-copy multi-color graphics Laser Printer shall be provided for recording graphic displays and associated dynamic data. Printer shall meet minimum requirements as follows: Print speed – Black: up to 20 ppm; color: up to 4 ppm First page out – 18 seconds black, 29 seconds color Resolution- 600 by 600 dpi Hi-Speed USB 2.0, IEEE 1284-B compliant parallel port Languages – PCL 6 and Postscript level 3 emulation with automatic language switching Font capabilities – 80 TrueType TM internal scalable PCL 6 fonts; 80 TrueType internal scalable HP postscript fonts	No	1	116,549	116,548.95
4	**SENSORS AND FIELD DEVICES**				
4.1	Supplying, Installing, Testing and Commissioning of the following sensors / transducers / transmitters				
a	UL Listed Current Relay with built in LEDs for On / Off commands Status	No	15	2,107	31,602.90
b	Water Level Switches for indicating Level Status in sumps.	No	3	10,591	31,772.58
c	Differential Pressure Switch across the Pumps for indicating the Pump status of Pumps complete with all accessories	No	5	10,470	52,348.30
d	DC Voltage Transducer	No	2	6,787	13,574.40
5	**WIRING AND CONDUITING**				

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION BMS					
S.N.	**Description**	**Unit**	**Qty**	**Unit Price (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Supply, Installation, testing and commissioning of following control cables for Analogue and Digital signals laid in GI conduit of 2mm thickness and 20mm dia with supports at every 1.5 meter for vertical runs and 2.5 meter for horizontal runs.				
5.1	2 Core X 1.0 Sq. mm copper conductor, aluminium shielded, FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided.	Mtrs	1000	43	43,430.00
5.2	4 Core X 0.5 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	300	110	33,027.00
5.3	6 Core X 1.0 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	55	122	6,721.55
5.4	12 Core X 1.0 Sq. mm copper conductor, aluminium shielded, twisted pairs,FRLS, PVC insulated cables & withstand temperature of 70 deg C aluminum tape 0.1 mm longitudinally laid and in contact with the uninsulated drain wire or un-insulated circuit protective conductor (cpc) shall be provided	Mtrs	125	209	26,133.75
5.5	Flexible PVC Flexible conduit for termination in the PLC Panels	Mtrs	550	96	52,772.50
					7,597,777

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
Plumbing Works					
1	**PUMPS**				
1.1	Providing, fixing, testing and commissioning of Vertical in line type pump set with SS casing, SS impeller and SS shaft suitable for operation on 400/440 volts, 3 phase 2900 RPM, TEFC electric motor mounted on a common channel base plate with coupling guard, 150mm dia pressure gauge, GM isolation cock and cement concrete foundation with plaster complete as required.				
a)	Water transfer Pumps	SET	1	183,280	183,280
	Pump capacity - 200 LPM				
	Head - 50 M				
	RPM - 2900				
1.2	Providing, fixing and commissioning non clog type mono block submersible drainage pumps suitable for handling solids of 12 mm size with totally water and dust proof motor as specified complete with motor control panel and float switch, inclusive of all terminations and earthing required all complete as per specifications.				
(a)	Capacity 300 LPM & Head 10 M	SET	1	96,350	96,350
1.3	BORING OF TUBEWELL				
	Construction of bore well all complete comprising with				

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
	Boring/ driling 350 mm dia bore in all classes of soil, murrum, disintegrated or soft rock including making strata charts, transportation, installation, removal of tools and plants after completion of work all as per direction of engineer in-charge up to 130m depth	Metre	320	1,832	586,252
	Extra over Item 'a' for boring in hard Rock	Metre	160	539	86,214
	supplying,assembling,lowering and fixing 200 mm dia casing blind MS pipe complete with sockets and having wall thickness not less than 6mm with treated socketed ends as required and painting outside with two coats of anti-corrosive paint of approved brand and manufacture all complete as per directions of engineer-in-charge	Metre	160	3,233	517,282
	supplying, assembling,lowering and fixing 200mm dia Slotted MS pipe complete with sockets and having wall thickness not less than 6mm and slots 1.5mm to 2mm with treated socketed ends as required and painting outside with two coats of anti-corrosive paint of approved manufacture all complete as per specifications or direction of engineer-in-charge	Metre	160	3,772	603,495
	Supplying and filling Pea gravel Filter fill between bore and pipe assembly	m3	16	2,586	41,383
	Cleaning & developing of borewell by air compressor for at least 60 hrs. and codutiing Yield tests as per IS 2800 Part-II	Hrs	240	377	90,524
	Testing water samples from the well for biological and chemical contents	Each	4	16,165	64,660

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.4	Providing and fixing single / multistage submersible tubewell pump suitable for 150mm bore with stainless steel casing. NORYL impeller, stainless steel shaft and built in non return valve coupled with submersible squirrel cage motors suitable for 145V +- 10% volts. 3 phase, 50 cycles AC supply.				
	Capacity 200 LPM				
	Head 50m, 5.0 HP	Each	1	32,117	32,117
1.12	50 mm dia GI column pipe of jindal / TT Swastic make heavy class duly flanged.	Metre	150	7,280	1,092,057
1.13	Providing and fixing 50 mm Cable clip with nuts and bolts	No.	40	678	27,108
1.14	Providing and fixing 50 mm supporting clamp with nuts and bolts	Pair	10	862	8,621
1.15	Providing and fixing 3C - 6 sqm Submersible Cable	Metre	150	247	36,996
1.16	Providing and fixing Steel wire rope 6 mm dia complete with wire rope clamps for safety of pump set.	Metre	120	123	14,799
1.5	Supplying and laying 1.1 KV grade aluminium conductor PVC insulated and PVC sheathed armoured cable including 8 SWG GI earth wire on surface/cable tray as required.	Metre	30	617	18,498
1.6	Providing and fixing dust and vermin proof motor control panel fabricaed from 14 SWG MS sheet with stove enamelled paint and comprising of (For tube well pumps)				
a)	One feeder of 63 ampere 4 pole ELCB.				
b)	One fully Automatic DOL starter with push button indicating lights.				

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
c)	One panel type volt meter 96 mm square with rotary selection switch for reading voltage between face and neutral or incoming feeder.				
d)	Three neon phase indicating light on the incoming main.				
e)	One Ampere meter 96 mm square panel type of appropriate range.				
f)	Etched plastic identification plates for all switch gears.				
g)	Space for liquid level controller.				
h)	All internal wiring should be colour coded from incoming main to switch gear,starters,meters,Indicating lights (Compartment light with min front area 1.50 sqm & 0.30 m deep)	NO.	2	32,010	64,020
1.7	Providing and fixing of 150 mm dia tail plug with all required specials complete as per directions of the Engineer-in-Charge.	Set	2	803	1,606
1.8	Providing and fixing Transistorised liquid level controllers with low voltage Relays and Seamless Steel probes and PVC shroud, including necessary wiring and conduiting from probes to display panel/motor control panels and to provide Audible Alarm for low level for each underground tank. (The cost of all required cabling from probes to Motor control panels to be including in the rate).				
1.8.1	For Domestic Filter feed Pumps				
	To start domestic filter feed pump at low water level in domestic treated water underground tank and stop at high water level in treated water tank and low waterdomestic raw water tank.	Set	2	22,482	44,964

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.8.2	For Domestic over head tank				
	To start pump at low water level in overhead tank and stop at high water level in overhead tank and low water level in treated water tank under ground tank.	Set	2	22,482	44,964
1.8.3	For Flushing over head tank				
	To start pump at low water level in overhead tank and stop at high water level in overhead tank and low water level in underground tank.	Set	2	22,482	44,964
1.9	Providing and fixing C.I. wafer type Butterfly Valves conforming to PN 10/13095 with nuts, bolts, washers, 3mm thick insertion ruber gasket and two matching flanges complete as per M & W specification.				
b)	65 mm dia	Each	9	4,068	36,613
c)	80 mm dia	Each	2	4,818	9,635
d)	100 mm dia	Each	6	5,513	33,080
1.10	Providing and fixing gunmetal pressure gauge (100 mm dia) of rating (0-10 kg/cm2) with gunmetal isolating cock and chrome plated copper pipe diameter 150 mm.	Each	9	1,333	11,999
1.11	Providing and fixing CI Double Flanged 'Y' type Strainers of the following sizes with nuts, bolts, gaskets etc. complete in all respects as described on the M & W Specification				
a)	100 mm dia	Each	4	10,384	41,538

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.12	Providing & fixing MS vent U type pipe complete with painting with enamel paint all complete as per direction of engineer-in-charge.				
	100 mm dia	Each	9	3,426	30,832
1.13	Design, manufacture, supply, installation, testing and commissioning of the following integrated, cubicle type, dead fornt, extensible, sheet steel control panel, to the foundation. The panel shall be suitable for 415 volts, 50 cycles, 4 wire supply. Quoted price shall be including with 25mm thick rubber mats, wiring, cabling of approved size, control wiring and copper earthing from control panel to various equipment like motor starters, pump motors etc. including making end terminations etc. The following components and accessories shall be mounted within each control panel.				
(a)	One No. 100 amps TPN incoming MCCB complete with the following:				
i)	1 No. 0-500 volts 96x96 sq. mm voltmeter with selector switch and shall be protected by 2 amps MCB's. (1 set)				
ii)	0-200 amps 96x96 square mm ammeter with selector switch and 300/5 CT's. (1 set)				
iii)	Phase indicating lights with toggle switches and shall be protected by 2 amps MCB's. (3 sets)				

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
b)	150 amps TPN tinned copper bus bars with heat shrinkable insulation sleeve.				
c)	Outgoing Feeders/Starters.				
i)	16 amps TPN MCB with DOL starter with built-in SPP each suitable for 2 HP for filter feed pumps (2 nos).				
ii)	16 amps TPN MCB with DOL starter with built-in SPP each suitable for 3 HP for domestic treated water pumps (2 nos).				
iii)	32 amps TPN MCB with DOL starter with built-in SPP each suitable for 5 HP for flushing water transfer pumps (2 nos).				
iv)	16 amps TPN MCB outgoing feeder suitable for 2-3 HP submersible drainage pumps panel (2 nos).				
v)	32 amps TPN MCB with built-in SPP each suitable for 5 HP tubewell pump & drainage pump panels (4sets)				
vi)	Spares				
a)	63 amps TPN MCB - 2 Nos.				
b)	32 amps TPN MCB - 2 Nos.				
Note :					
(a)	All switch gear/panels shall be suitable for 10 KA rating.				
(b)	All outgoing will have 96 sq. mm size ammeter and CT.				

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
(c)	All starter will have spare 10 amps 230 V coil auxiliary contractor for building Automation system.				
(d)	All starter units for pumps to be provided with 3 level liquid level contractor.				
(e)	Lamps.				
(f)	All pumps to be provided with duty selector switch.				
(g)	All pumps to be provided with sequence timer 220/440 V AC/DC and alternate working of pumps between 6 to 8 hours or alternate use of pumps after one service in sequence.				
(h)	All pumps to be provided with over load relay.				
(i)	All starter to be provided with single phase preventor.				
(j)	Necessary cable alleys for space switches, level controller internal wiring and copper earthing of all equipment shall also be included. All switch gears/control gears shall be motor duty rating.	Set	2	337,226	674,453
1.14	Supplying and laying the PVC insulated & sheathed FRLS Armoured cables of 1.1 K.V. Aluminium Conductor including supplying and making and termination with brass compression glands:				
a)	3 Core x 2.5 sq.mm	Metre	40	150	5,995
b)	3 Core x 4 sq.mm	Metre	40	182	7,280

(Attachment No-6 to Addendum No-1) PART-D AAREY STATION PLUMBING PUMPS					
S.No.	**Description**	**Unit**	**Qty**	**UnitPrice (Rs)**	**Total Amount (Rs)**
1	**2**	**3**	**4**	**5**	**6**
1.15	Fabricating and installing following size of perforated M.S. cable trays including horizontal and vertical bends, reducers, tees, cross members and other accessories as required and duly suspended from the ceiling with M.S. suspenders including painting, etc, as required.				
a)	150 mm width x 50 mm depth x 1.6 mm thickness.	Metre	60	375	22,482
	TOTAL OF SUBHEAD PUMPS				**4,574,060**

BIDDING DOCUMENTS

MUMBAI METRO RAIL LINE 3

EMPLOYER'S REQUIREMENTS

GENERAL SPECIFICATIONS

Volume 3 OF 6

Appendix 19
SYSTEM INTERFACE MANAGEMENT

September 2017

MUMBAI METRO RAIL CORPORATION LIMITED
R13 NAMTTRI Building E-Block,
Bandra Kurla Complex, Bandra (East),
Mumbai – 400 051, India.

MUMBAI METRO RAIL LINE 3

Volume 3 OF 6

Appendix 19

SYSTEM INTERFACE MANAGEMENT

	Issuing entity	Discipline	Area	Document No.	Revision Index
	GCC	301	P00	1600033	I

DOCUMENT / DRAWING TECHNICAL VERIFICATION AND REVISION RECORD

PROJECT NAME	**Mumbai Metro Rail Line 3**		
***DOC / NO.**	**GCC-MMR-301-P00-1600033**	**DATE OF FIRST ISSUE**	**02-02-2016**
***DOC / TITLE**	**System Interface Management Requirement**		

REV No.	DATE OF ISSUE/REV.	DESCRIPTION	PREPARED/ DESIGNED	CHECKED	APPROVED
A	02-02-2016	First Diffusion	BDE	HFL	RJM
B	16-02-2016	Updated for RS RFP	BDE	HFL	RJM
C	18-02-2016	Official Diffusion	BDE	HFL	RJM
D	28/03/2016	Updated with Aarey Station Interface Sheet and Rolling Stock	BDE	HFL	RJM
E	06/05/2016	Attachment N Updated with all Interface Sheet with Rolling Stock	BDE	HFL	RJM
F	06/05/2016	Attachment N to be completed/Modified for others Contracts by Key Experts	BDE	HFL	RJM
G	30/08/2016	Attachment E and F updated	PNK	BDE	RJM
H	18/01/2017	Attachment E, F2 & M updated. Minor changes and corrections done.	PNK	BDE	RJM
I	10/07/2017	Attachment E - Master Interface Matrix (MIM) & Attachment F -Interface Co-ordination Sheet-Contract Codes	PNK	BDE	RJM

TABLE OF CONTENTS

EMPLOYER'S REQUIREMENTS

DESIGN AND CONSTRUCTION INTERFACE MANAGEMENT

1. DEFINITIONS AND ABBREVIATIONS

1.1 Chief Interface Coordinator (CIC) means a suitably qualified person, assigned by a Contractor, who is the Team Leader responsible for administrating, monitoring, managing, supervising and resolving all interface issues between Interfacing Contractors for the Mumbai Metro Line 3 Project.

1.2 General Consultant Interface Manager (GCIM) means the responsible person, assigned by the PM who is the main coordinatorof all project interfaces with **RE** and contractors **CIC**. He shall coordinate the overall technical point of the project from the point of view of proper integration of a System and Civil Work in all technical and operational areas to ensure delivery of safe and coherent metro system. He shall attend co-ordination meetings with all project contractor's **CIC**, and communicate issues & concerns relating to co-ordination, approvals and systems & Civil interfaces.

1.3 Combined Services Drawings (CSD) means the drawings produced by the Civil Work Contractor, showing the locations, sizes and details of all of the Contractor's equipment, cable containment, pipes, etc. These drawings are to be used to enable all equipment, pipes, cables, etc. to be installed without conflict and to enable future changes or modifications to be performed without impacting the existing installation.

1.4 Interface means the region of interaction across the common boundary between two adjacent but separately managed and controlled parts of the Project. The co-ordination and management of the interaction regions is necessary to ensure that the overall scope and definition of the Project works is complete and seamless across all such boundaries.

1.5 Interfacing Contractors means any of the following whose activities or the works they are engaged to carry out in any way or at any time affect or are affected by the Works:

a. Project Contractors and design or specialist consultants engaged on the Project from time to time by the Employer, the Government of Republic of India, the Government of Maharashtra or the utility providers;
b. Utility providers;
c. Developers or franchisees appointed on the Project from time to time by the Employer;
d. Subcontractors of any tier of the contractors within category (a) above, and contractors and subcontractors of any tier of utility providers, developers and franchisees within categories (b) and (c) above;
e. Provided that the definition shall exclude the Contractor and his subcontractors of any tier in relation to the Works and in any other capacity which would otherwise fall within categories (a) to (d) above in relation to other works.

1.6 Interface Co-ordination Sheet (ICS) means a document produced by the Contractor which defines the integration and interfaces between his contract and the Interfacing Contractors employed on the Project.

1.7 Interface Management Programme (IMPG) means the programme produced by the Contractor, developed and updated on a quarterly basis, which describes the sequence and timing of each of the Interfacing Contractor's scope of work, and clearly describes dependencies between his Works and the work of the Interfacing Contractors.

1.8 Interface Management Plan (IMP) means the Report prepared by the Contractor, developed and updated on a quarterly basis that provides a clear description of his interfaces both sequentially and technically as specified in the Contract. The report will be reviewed in accordance with this procedure and is a pre-requisite to the PM's Notice of No Objection.

1.9 Interface Specification (IS) means the specification document developed by the Lead Contractor for the interfacing part of his project on the basis of, and by integrating into his design, the information provided by the Interfacing Contractors in accordance with the interface agreements as contained in the **ICS**. The Interface specification needs to be agreed upon by both the Lead Contractor and the Interfacing Contractor's before it is submitted to the **PM** for Notice of No Objection.

1.10 Master Interface Log (MIL) is an electronic Log of identified interfaces maintained by the Interface Supporting Team (**IST**) in the format given in **Attachment D**, showing (among others) updated status and priority rating of each interface agreement, by its unique serial number, for the purpose of monitoring the progress of Interface agreements from inception to close-out.

1.11 Master Interface Matrix (MIM) means the document developed by the **PM**, which may be updated, and/or expanded to include additional Interfacing Contractors, by the PM as the Project progresses. The purpose of the Master Interface Matrix is to allocate which Interfacing Contractors are the lead party(s) for each contract.

1.12 Resident Engineer (RE) means the General Consultant Discipline Key Chief Resident Engineer, who is in charge of the monitor progress in interface agreements of his contractor with other interfacing contractors, on site in accordance with the IMP/IMPG and resolve interface issues which the interfacing contractors are unable to resolve among themselves. He shall identify interface issues that cannot be resolved at his level and alert the GCIM about them in the course of his day-to-day interactions with the GCIM for taking further action. He shall pursue the matter till the required information is exchanged in time.

1.13 Structural, Electrical and Mechanical Drawings (SEM) means those drawings produced by the Civil Work Contractor, showing the locations, sizes and details for all structural openings, plinths, embedments, sumps, floor chases, etc. required for the installation of all equipment, cable trays, pipes, etc.

1.14 Zone of Interface means where two or more components of the railway provided by two or more Interfacing Contractors combine to provide a single element.

Acronyms and abbreviation will appear immediately after the first time the words are used. Thereafter, only the acronym or abbreviation will be used in the Appendix 19.

Acronym	Description
CIC	Chief Interface Coordinator (of the Contractor)
CSD	Combined Services Drawing
GC	General Consultant for MML3
GCIM	General Consultant Interface Manager
ICS	Interface Co-ordination Sheet – Monthly report
IS	Interface Specification
IST	Interface Support Team

IST TL	Interface Support Team Leader (Project Rail Systems Manager, a Member of the Project Management Team, discharges this function.)
IMP	Interface Management Plan
IMPG	Interface Management Programme
MIM	Master Interface Matrix
MIL	Master Interface Log
MMRC	Mumbai Metro Rail Corporation
MOM	Minute Of Meeting
PM	Project Manager as Employer's Representative
RE	Resident Engineer as Project Manager's Representative
SEM	Structural Electrical and Mechanical Drawings

2. INTRODUCTION

2.1 Interface and co-ordination of the Works will include the co-ordination of all design, technical and programming matters with the various Interfacing Contractors to achieve fully co-ordinated construction and installation of the facilities.

2.2 This **Appendix 19** describes the Contractor's responsibilities with regard to interface management and co-ordination with those Interfacing Contractors and who are responsible for undertaking work, which interfaces with the Contract. The Contractor's responsibility for interface co-ordination shall include currently defined Interfacing Contractors and those who shall be identified in the future. This responsibility is not limited to a particular number of Interfacing Contractors.

2.3 The Contractor's responsibility for interface co-ordination shall include identification of Interfacing Contractors, subcontractors, including subcontractors within his own Contract.and those who shall be subsequently identified during the course of the Contract for whom the Contractor will need to interface and coordinate the Works. This in no way detracts from the fact that the Contractor remains solely responsible for identifying, liaising, and co-ordinating with all Interfacing Contractors in relation to the Works.

2.4 The **PM** will monitor and oversee the interface Management activities by the contractor and will specifically provide direction or information in the following circumstances.

a) When the interfacing contract has not yet been awarded.

b) When common agreement cannot reached between the interfacing parties.

c) When it is in the interest of the project programme, quality or safety to issue direction.

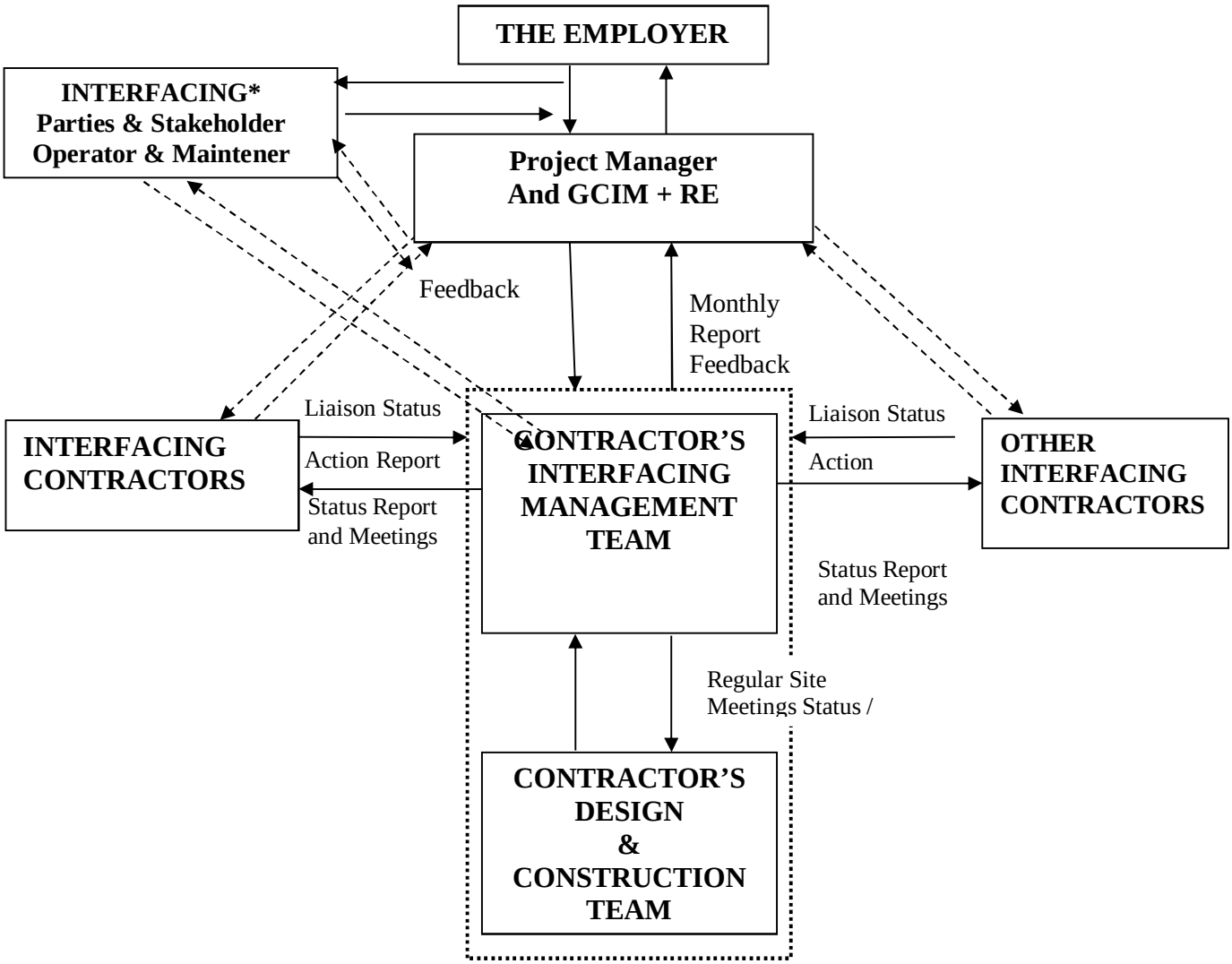
Direction or information provided by the employer's representative where ever necessary, shall not in any way relieve the contractor of his full responsibility to ensure the correctness, accuracy and suitability of the interface implementation and required specification.

2.5 The Contractor shall at all times use his best endeavours to resolve all interfaces applicable to the Contract and shall be proactive in seeking out interface issues and their solutions.

2.6 The Contractor shall ensure that all of the above Interface requirements are included in his Interface Management Plan, refer to Clause 6 of this **Appendix 19**. Flow charts illustrating the process of entering into an Interface agreement/disagreement and Monitoring its progress with the help of the Interface Co-ordination Sheet are provided as **Attachment A** (Flow chart creation /elaboration of the Interface Co-ordination Sheet) and **Attachment B** (Flow chart for Progress

Monitoring of Interface Agreement)of this **Appendix 19**. And Figure 1 gives a schematic presentation of the Interface Communication and Co-ordination processes between the various role-players in the Project.

2.7 The Contractor's internal sub-contractors' and suppliers' interfaces are the sole responsibility of the Contractor and are not covered in this **Appendix 19**. However, the Contractor shall co-ordinate and manage these interfaces in such a way as to identify and cater for the requirements of the Interfacing Contractors and domestic interfaces, including but not limited to, the avoidance of clashes and sequencing of Works. The Contractor shall compile an internal **IMP** for his own use, a copy of which shall be furnished to the **PM** on request at any time.



Contractor's Organisation

Figure 1 – Interface Communication and Co-ordination Model

INTERFACING *
Interfacing Parties could be: Utility, Telephone Operator, Water and Electricity….
Interfacing Stakeholder could be: Safety Authority, ISA, RDSO, CMRS, Fire, Police and EIG.

3. CO-ORDINATION

3.1 Contractor's Co-ordination Responsibilities

The Contractor shall co-ordinate with the **PM** (**GCIM** and/or **RE**) and shall be required to attend meetings on issues appertaining to Government authorities and utility agencies regarding the services/facilities to be provided by them for the project.

The Contractor shall ensure that the work of all Interfacing Contractors can be carried out in accordance with the Interface Management Plan prepared by the Contractor.

3.2 Site Co-ordination & Attendance

Chapter 3.2 describes what the Civil Work Contractor shall do.

3.2.1. The Civil Work Contractor shall, at his own cost, provide all attendance on and co-ordination with Interfacing Contractor. The following items are not a comprehensive or exhaustive list of the co-ordination or interface attendance items to be provided for the Interfacing Contractor's use, but are intended to provide an outline of the content of amenities, services and facilities for which the Civil Work Contractor is responsible:

a) Single point of contact for meetings, actions, planning, scheduling and co-ordinating.

b) Site access

The Civil Work Contractor shall co-ordinate with the Interfacing Contractor and provide access and use of temporary access roads to and from and within the Site. The Civil Work Contractor shall co-ordinate all vehicle movements, deliveries and other activities with the Interfacing Contractor so as to ensure conflicts of use will be controlled on and around the Site.

c) Storage and Accommodation area

The Interfacing Contractor will require limited temporary site accommodation and storage areas. The Civil Work Contractor shall agree with the Interfacing Contractor access and areas for storage and temporary site accommodation prior to their commencing work on Site.

d) Work space requirement and sequence of Works

e) Shared use of Civil Work Contractor's scaffold

The Civil Work Contractor shall co-ordinate with the Interfacing Contractor and provide free use and shared access of his erected scaffolding, ladders and hoists should they be available at the time the Interfacing Contractor requires to use them. Notwithstanding this requirement, the Civil Work Contractor shall at all times remain responsible for the management of safety and the maintenance of such scaffolding, ladders and landings. The Civil Work Contractor will not be required to adapt or erect access scaffolds specifically for the use of Interfacing Contractor.

If the Interfacing Contractor erects and uses his own scaffold he will be required to adhere to the Civil Work Contractor's safety rules and access routing for equipment and materials. The Civil Work Contractor shall ensure that all scaffolds of Interfacing Contractor are erected in a safe manner and are subject to permits for use issued by the Contractor.

f) Setting out control points

g) Access Openings

The Civil Work Contractor will form all penetrations and delivery openings and subsequently close them (either temporary or permanent) for access to rooms or areas for the delivery of equipment and materials.

h) The Civil Work Contractor will be required to install all temporary and permanent lifting hooks and beams shown Temporary lighting requirements 100 lux minimum.

i) Temporary power and water supplies have to be provided at agreed locations around the Site for the Interfacing Contractor's use.

j) Water tightness
All rooms and areas handed over to Interfacing Contractor shall be in a watertight condition and maintained as such.

k) Ensure all electrical supplies both temporary and permanent have the correct testing and commissioning certification.

l) Waste management and disposal.

m) Appropriate protection to finishes, walls, floors, ceilings and equipment using polythene, hardboard, steel plates etc.

n) Programme agreement for mobilizing and demobilizing.

o) Firefighting and supply and maintenance of fire extinguishing equipment and devices pursuant to the Civil Work Contractor's obligations.

p) Construction interface co-ordination management of penetrations in structures, embedded and cast-in items, etc.

q) Temporary Drainage
The Civil Work Contractor shall provide, operate and maintain all necessary temporary drainage, sumps, silt traps and sump pumps to collect and dispose of wastewater from Interfacing Contractor construction processes including installation, testing and commissioning activities.

r) Sanitation facilities
The Civil Work Contractor shall provide all sanitation facilities and the disposal of waste. No unauthorised sanitation facility will be allowed on the Site.

s) Making good and fire stopping of penetrations.

t) Lifting apparatus and hoists
The Civil Work Contractor will be required to install all temporary and permanent lifting hooks and beams shown on the drawings and the Specification required for installation and/or maintenance purposes. The Civil Work Contractor will be responsible for the testing and labeling of all apparatus. The Civil Work Contractor will be required to make available any lifting or hoist apparatus on Site as required by the Interfacing Civil Work Contractor at agreed times and duration for their use. The Civil Work Contractor shall be responsible for the maintenance testing and operational management of hoists. The Civil Work Contractor shall make available his cranes for lifting equipment or materials for Interfacing Contractor.

u) Health and Welfare Facilities
The Civil Work Contractor shall allow Interfacing Contractor use of his health, welfare and mess facilities, and temporary background lighting. He shall liaise with the Interfacing Contractor to determine their planned and actual manning levels and ensure that sufficient facilities are provided prior to them commencing work on Site. The facilities shall be maintained on Site until the Interfacing Contractor has completed its Works and demobilised or such earlier time as the **PM** may direct.

3.2.2. The Civil Work Contractor is deemed to have ascertained for himself the full scope of his responsibilities and obligations under the Contract in terms of attendance on and co-ordination with Interfacing Contractor and shall not be entitled to any additional payment, Cost or extension of time for completion should he have failed to do so.

3.2.3. The Civil Work Contractor shall make due allowance for providing Attendance, including power and other utilities supplies, throughout all phases of the Interfacing Contractor work including testing and commissioning and where supplies to various Interfacing Contractors need special consideration during testing and performance trials under peak load conditions.

4 INTERFACE

4.1 Co-Ordination of Contractor's Scope of Work

In accordance with the requirements of the Conditions of Contract and other specified requirements**,** the Contractor shall co-ordinate his own work with that of all Interfacing Contractors and ensure that the design, construction, installation and testing requirements of the Interfacing Contractors are incorporated into the Civil Work Contractor's co-ordinated plans, programmes and Works. The Contractor shall proactively seek out interface issues and solutions.

In addition to the Civil Work Contractor's obligations to the Interfacing Contractors contained elsewhere in the Contract, the Civil Work Contractor shall provide / handover occupation or access as required, to the Interfacing Contractors to those parts of the Works which are subject to Key Dates by the required Key Dates.

The Civil Work Contractor shall complete those parts of the Works, which are subject to Key Dates, by the required Key Dates that are specified in the Appendix to Tender and/or **Appendix 3** of – Employer's Requirements of this Contract. Those parts of the Works subject to Key Dates shall be completed to a state whereby any Interfacing Contractor can immediately commence his works without the need to make any change, addition or modification to the Contractor's Works.

4.2 Interfacing Contractors

4.2.1 The Interfacing Contractors will require interface and co-ordination for information, programming, drawings acceptance, handover etc. as shown on the Interface Co-ordination Sheet enclosed in **Attachment F** of this **Appendix 19**.

However, the Contractor should note the Interface Co-ordination Sheet shown herein has been compiled by the **PM** (and **GCIM**/**RE**), and is therefore given as example only.

The Contractor's responsibilities in this respect are in no means restricted by the details listed in such sheets and no warranty is given by the Employer or the **PM** that all interfaces and Interfacing Contractors have been included in such. The Contractor is to confirm and verify all of the details included in the Interface Co-ordination Sheets, and his review should ensure that all interfaces have been included.

The Contractor shall take overall responsibility for the Interface Co-ordination Sheets, which must be submitted to the **PM** (and **GCIM**/**RE**) for a Notice of No Objection.

4.2.2 The Master Interface Matrix (**MIM**), enclosed in **Attachment E**, assigns the Contractor which has been designated as the Lead party(s) for each interfacing contractor. The **MIM** has been developed by the **PM** (and **GCIM**), which he may update and/or expand at any time to include additional Interfacing Contractors, and the Contractors lump sum price for

Interface Management shall be deemed to include any such additional works related to interfacing.

4.2.3 The Contractor shall expand the **MIM** and the **ICS** for additional subcontractor system interfaces. Those additional subcontractors system Interfaces should include interaction areas between different systems in the same project contractor scope. In that case the Contractor shall take overall responsibility for its own **MIM** and **ICS** and shall submit the expandable **MIM** and **ICS** to the **PM** (and **GCIM**/**RE**) for approval.

4.2.4 The leading Interfacing Contractor shall be responsible for administrating, monitoring, managing, supervising and resolving all interface issues between all Interfacing Contractors. Any expansion during the course of the works should be done by the Lead Interfacing Party.

4.2.5 In a situation when the Lead Contract has not yet been awarded and the Interfacing contractor has commenced work, the **PM** (and **GCIM**) will perform the co-ordination activities including preparation of tentative **ICS**/**IS**, with the express understanding that they may undergo changes as and when the Lead Contractor commences his work on being awarded the Contract etc.

4.2.6 Where an interfacing contract has yet to be awarded, the Lead Contractor shall proceed with the co-ordination activities (including preparation of **ICS** and Interface specification) as instructed by the **PM** until such time when the Interfacing Contractor is available.

4.3 Interfacing Contractors - Communications and Information Exchange

4.3.1 GENERAL

a) The Contractor shall communicate, co-ordinate and exchange information directly with the Interfacing Contractors and the Contractor shall keep the **PM** (and **GCIM**/**RE**) advised at all times. Information necessary to fulfil the Contractor's interface obligations shall be directly requested and obtained from the Interfacing Parties, and receipt acknowledged. Conversely, the Contractor shall provide directly to the Interfacing Contractors information within the Contractor's scope that is required by them.

b) All requests for information, acknowledgement of receipt of information, and any official communication between the Contractor and the Interfacing Contractors shall be made in writing, with a copy to the **PM** for his information. The **PM** (and **GCIM**/**RE**) shall be invited to attend all interface meetings between the Contractor and the Interfacing Contractors. Irrespective of whether these meetings were attended by the **PM** or not, the contractor's monthly progress report to **PM** shall invariably include the details of all interface meetings held and decisions arrived.

c) The Contractor's programme shall allow time for the availability of necessary interface information from the Interfacing Contractors and in this regard the Contractor shall, where required, proceed on a late start basis to allow adequate time for others to provide required information and thereby achieve design process compatibility.

d) The Contractor shall allow for the fact that many of the design and construction activities for the different contracts will be proceeding concurrently. In the event that certain interface information is not forthcoming at the time targeted, the Contractor shall be responsible to resolve the matter with the relevant Interfacing Contractor without recourse to the **PM**, and where necessary develop alternative interim arrangements such that the interface information is accommodated at a later date.

e) Definitive dates for transfer of information and particular interface actions shall be confirmed between the Contractor and the Interfacing Contractors.

4.3.2 INTERFACING FUNCTIONS

The Interfacing Contractors are responsible for, but not limited to, the following;

a) The management of Contract to Contract Interfaces as required;
b) Preparing the Interface Management Plan and subsequent procedures;
c) Preparing their Interface Management Programmes in accordance with this procedure and submitting these to the Interfacing Contractors for concurrence;
d) Preparing the Interface Management Programmes and submitting these to the **PM** for a Notice of No Objection;
e) Preparing their Interface Co-ordination Sheets and Interface Specifications and issuing same to the relevant Interface Contractors and **PM**;
f) Co-ordinating with the relevant Interface Contractors to establish coordinated **CSD** & **SEM** Drawings;
g) Maintaining their **ICS** updated continuously and attaching it to their Monthly Progress Report submitted to the **PM** in accordance with the requirements of the Contract and this **Appendix 19.**

4.3.3 DOCUMENTATION REVIEW

The Contractor shall, as a minimum:

a) Review those portions of the Specification and Drawings relevant to the interface and transmit such information to the Interfacing Contractors;
b) Co-ordinate and co-operate with Interfacing Contractors on all Site related matters including, but not limited to, Site access and occupation, attendance, safety, verification of work compatibility, survey control, etc.
c) Review the interface information received and agree in writing with the Interfacing Contractors that the interface information is adequate for that stage of that activity.

4.3.4 DESIGN STAGE

The design interface is an iterative process, thus throughout the design process, the Contractor shall be responsible for coordinating his own design with Interfacing Contractors to develop interface designs in conjunction and co-operation with the designers of Interfacing Contractors. These interface designs will be monitored and have to be given Notice of No Objection by the **PM**, but the Contractor shall work directly with the Interfacing Contractors to develop designs which are mutually acceptable to all parties.

The Contractor shall, immediately upon Contract Award, gather all necessary information and develop his design to a level where meaningful interaction can take place as soon as the Interfacing Contractors are available.

4.3.5 INTERFACE DESIGN CHANGE PROCESS

The Contractor shall establish an interface design change process to ensure that:

a) All proposed changes for a specific interface are reported, recorded and resolved;

b) Proposed changes are fully evaluated;
c) Internal/External communications and distribution paths are properly defined.

4.3.6 CONSTRUCTION / INSTALLATION SATGE

During construction the Contractor shall, when a construction item is ready for field inspection, advise the Interfacing Contractor in advance to verify compatibility with the Interfacing Contractor's needs.

The Contractor shall:

a) Advise the Interfacing Contractors in writing when the as-constructed interface-related work can be inspected, and provide the necessary Site access and occupation;
b) Request in writing and obtain from the Interfacing Contractors, interface information required for that stage of the Contract;
c) Agree in writing with the Interfacing Contractors on the adoption of any applicable comments on the constructed work;
d) Agree that any testing and commissioning for works can be carried out in accordance with the Interface Management Plan;
e) Conduct on-Site inspections of the work elements, and give comments in writing to the Interfacing Contractors;
f) Agree in writing with the Interfacing Contractors that the as-constructed work meets the interface requirements;
g) Where the execution of work by Interfacing Contractors depends upon the Contractor's site management or upon information to be given by the Contractor, the Contractor shall provide the Interfacing Contractors with the required services or the correct and accurate information required to enable the Interfacing Contractors to meet thier programme for the construction or installation of their works.

4.3.7 TEST & COMMISSIONING STAGE

The Contractor shall co-ordinate all of his testing and commissioning activities with the Interfacing Contractors. Interface commissioning shall demonstrate that the delivered interface, part A of the interface, is ready and meets the interface requirements of the interface part B, and vice versa.

Successful completion of all interface commissioning shall prove its readiness for commissioning of the overall contract scope and completion of the overall Metro-rail Project, prior to handover to the Employer for their commercial operation.

4.3.8 MAINTENANCE STAGE

The Contractor shall co-ordinate all of his maintenance activities with the interfacing contractors. Important interface issues, daily maintenance should be jointly identified with interfacing contractor.

4.4 Resolution of Co-Ordination Difficulties

When the Contractor identifies interface co-ordination difficulties, the Contractor shall review the pertinent points of each Interfacing Contractor to determine possible compatible solutions in terms of sequence, timing and technical details. The Contractor shall then meet with the relevant Interfacing Contractor(s) to determine solutions, which are mutually acceptable to each Interfacing Contractor and advise the **PM**.

Where an acceptable solution has not been identified, the Contractor shall advise the **PM** in writing of the problems encountered. If, in the opinion of the PM, an interface is not proceeding satisfactorily, then the **PM** will review the matter, and establish a co-ordinated plan directing the Contractor and the Interfacing Contractor(s) on the required action. In the event that no agreement can be made between the Contractor and the Interfacing Contractor(s), the **PM** shall determine the requirements to the best of his knowledge, and his determination shall be final and binding on the Contractor and the Interfacing Contractor(s).

4.5 Interface Performance

The Contractor's performance in relation to his compliance with the interface requirements under the Contract shall be assessed by the **PM** three months after the Commencement Date and thereafter at three monthly intervals. The assessment will be in the form of an audit of the Contractor's interface management system. This audit will assess the Contractor's compliance with the responsibilities delineated in this **Appendix 19** and elsewhere as related to interface management and the preparation of the Interface Management Plan (**IMP**) and Programme and other documentation and procedures associated with Interface Management and Co-ordination.

The Contractor will be notified of non-conformances from the audit, which will require rectification. Where, in the opinion of the **PM**, the Contractor has failed to rectify a non-conformance within a reasonable period from the date of notification, this may lead to non-payment of any lump sums, until such time as the non-conformance has been rectified to the satisfaction of the **PM**, refer sub-clause below.

The Contract allows for continuous audits of the Contractor's compliance with his Interface Management Plan and the requirements of this **Appendix 19** of Employer's Requirements, and any extreme or continuing failures shall result in a negative audit report, which may lead to non-payment of the relevant payment item in the Preliminaries section of the Pricing Document. The decision of the **PM** in this regard shall be final.

5 CONTRACTOR'S INTERFACE MANAGEMENT SYSTEM

5.1 Interface Management System

The Contractor shall establish and maintain an Interface Management System to identify, control and monitor the interfaces of the Contract, which shall include, but not be restricted to, the following:

a) Establishment and maintenance of an Interface Management Team suitably qualified and experienced in co-ordination and interface management in relationship with the **GCIM**.

b) Provision, as one of his Key Personnel, of a Chief Interface Co-ordinator, to head the Interface Management Team, suitably qualified and experienced as noted in **Section A** of this Employer's Requirements, with the responsibility, experience and authority to resolve interface matters in accordance with the Contract. The Chief Interface Co-ordinator (**CIC**) will develop a monitoring and reporting procedure to be implemented by his team for the duration of the Contract.

c) Implement and maintain a strict monitored control of information transfer to the Interfacing Contractors, the Employer and the **PM** utilising the official channels of communication.

d) Provide a comprehensive interface schedule of Interfacing Contractors, including specialist domestic interfaces (i.e. specialist testing and commissioning engineers) identifying all interfacing activities and timetables of events.

e) Arrange all internal and external interface meetings. The **PM** may arrange regular meetings to monitor the status of interfaces, and may require special meetings asthat are necessary to resolve specific issues. The Contractor's Interface Management Team will be required to attend such meetings. The Contractor may request assistance from the **PM** (and **GCIM/RE**) to arrange meetings on particular subjects.

f) Providing the **PM** (and **GCIM/RE**) with all information and/or details of interfaces, including copies of all correspondence and material.

g) Providing the **PM** (and **GCIM/RE**) with access to information for the purpose of conducting audits on the interface system and for confirming that interface co-ordination is proceeding consistently with the Project requirements.

h) Establish interface dates for information, documentation, access or works completion requirements.

5.2 Interface Management Team

The Contractor's Interface Management Team will undertake and fulfil the following tasks:

a) Provide timely interface information when requested, anticipating the information needs of the Interfacing Contractors and transmitting such information as soon as it is available.

b) Pro-actively keep the Interfacing Contractors informed of any development of the Works related to the interfaces. Communicating and co-operating with the Interfacing Contractors to identify and resolve potential interface problems.

c) Advise the Interfacing Contractors on potential problems related to the interfaces, together with proposed solutions likely to be acceptable to Interfacing Contractors and which meet the needs of the Project.

d) Arrange and/or attend meetings with the Interfacing Contractors as necessary to resolve interface issues.

e) During each stage of the Contract, the Contractor shall directly communicate and co-ordinate with Interfacing Contractors as necessary to achieve a fully co-ordinated construction/installation.

f) Contractor shall issue true records of all interface meetings, with appropriate actions and attendance lists, to all Interfacing Contractors, whether in attendance or not, and to the **PM** (and **GCIM/RE**), within 3 days of the meeting. Minutes of meetings shall be signed by all parties in attendance, signifying their agreement to the contents thereof, before being formally issued by the Contractor.

The authority and responsibilities of all personnel involved in the Interface Management Team must be clearly defined in the **IMP**.

6 INTERFACE MANAGEMENT PLAN & INTERFACE MANAGEMENT PROGRAMME

6.1 General

The Contractor shall prepare the proposed Interface Management Plan and proposed Interface Management Programme, in accordance with **Section VI-A clause 3.4**, this clause 6 and based on the formats noted in **Attachments H**, to which the PM issues a Notice of No Objection. The Interface Management Plan (**IMP**) and Interface Management Programme (IMPG) shall completely define the Contractor's programme and methodology for interface co-ordination and management, whilst complying with all Key Dates stated in the Appendix to Tender and/or **Appendix 3** of this Employer's Requirements.

Subsequently they shall be kept up to date and submitted on a quarterly basis to the PM for scrutiny and Notice of No Objection, and a summary of the principal issues shall be included in each Monthly Progress Report. The Contractor shall note that each submission of these documents is subject to regular audits and the issue of a Notice of No Objection by the PM.

6.2 Interface Management Programme (IMPG)

The Interface Management Programme describes the sequencing and timing of each of the Interfacing Contractor's scope of work, clearly describing the interdependencies for all stages of the work between the Contractor's works and that of the Interfacing Contractors and complementing the Interface Management Plan, whilst complying with all Key Dates stated in the Appendix to Tender and/or **Appendix 3** of this Employer's Requirements.

The programme shall be structured to detail each of the primary zones of interface and the principal elements of the design and of the works requiring interfacing contribution from others. This Interface Management Programme shall also be related to the Contractor's Works Programme and shall show the sequences and timing agreed with the Interfacing Contractors to the necessary degree of detail to clearly illustrate each of the interfaces to be undertaken.

Targets to receive or supply information shall also be shown, with due allowance being given for the design process of others. Information relating to Contractual Key Dates and information exchange dates shall be shown for both the Contractor and the Interfacing Contractors to demonstrate a matching of design processes.

A record of these interfaces, with current status and agreed dates for information transfer, site inspections, access, occupation, handover, etc. shall be maintained and also identified on the **ICS**, refer Clause 7 below.

Refer to **Attachment K** - Guidance Notes for the Preparation of **IMPG**

6.3 Interface Management Plan (IMP)

The Interface Management Plan is that document which describes the Contractor's interface management in terms of providing a clear description of each of the interfaces, both technically and sequentially, and represents an account of how the Contractor proposes to achieve co-ordination of the Works. The description shall completely detail the Contractor's work scope and interface with each of the Interfacing Contractors in terms of technical description, sequence and timing for each of the elements required to achieve a coordinated design. The Contractor shall demonstrate how potential interface conflicts can be eliminated by design simplification. This document is also required to demonstrate that the co-ordinated design and construction details described therein fully comply with the needs of others, and agreement in writing of these details by the Interfacing Contractors will be a pre-requisite to the **PM** issuing a Notice of No Objection. In this step, the **IMP** shall be submitted to the **PM** for approval with this Notice of No Objection.

Refer to **Attachment L** – Guidance Notes for the Preparation of **IMP**.

6.4 Requirements For The Interface Management Programme & Interface Management Plan

The Interface Management Programme (**IMPG**) shall be a process-driven programme in a format to be agreed with the **PM**. The **IMPG** shall incorporate the key activities from both the Interfacing Contractors' and Contractor's Works programmes that will enable the Contractor to demonstrate that any Interface is being correctly managed and will result in fully co-ordinated construction / installation of works.

The Interface Management Plan and Interface Management Programme shall:

a) Follow the outline structure, numbering system, and related procedures in a format to be agreed with the **PM** (and **GCIM/RE**).
b) Be co-ordinated with the Interfacing Contractors to ensure compatibility of interface identification and definition.
c) Comply with the Key Dates stated in the Appendix to Tender and/**or Appendix 3** of this Section VI-A Employer's Requirements.
d) Be transmitted to the Interfacing Contractors concurrently with submittals to the PM.
e) Support the Works Programme to which the PM has given a Notice of No-Objection.
f) Address each zone of interface i.e. ancillary buildings, train stabling, trackwork external, trackwork internal, substations, signalling and telecommunications facilities, operation and control rooms, staff accommodation, external works etc. related to each design submission and stage of design or construction / installation.
g) List all relevant interfaces in detail, their status, and the corresponding source(s) of information.
h) Include interface information transfer dates which have been agreed by the Interfacing Contractors.
i) Accommodate comments and input required by the PM.
j) Include an account of how the interfaces are being managed.
k) Identify the latest information regarding agreements with the Interfacing Contractors and transfers of information.
l) Review and address the design, supply, installation, testing & commissioning programme of the Interfacing Contractors to ensure that the Key Dates of each contract can be achieved, and highlight any programme risks requiring management attention.
m) Identify any problems related to co-ordination with Interfacing Contractors.

6.5 Interface Specification.

6.5.1 The Interface Specification form enclosed in **Attachment C**, and associated drawings shall specify the proposed method and schedule for verifying the interface integrity, the individual equipment/system performance and the combined system performance.

The Interface Specification shall include a programme of tests to demonstrate the performance and integrity of the integrated system. The interface sheets developed by the **PM** (**GCIM**) are attached in **Appendix-19** – **Attachment N**. The attached interface sheets are not final. They are indicative in nature and do not relieve the Contractor's obligation to identify any new interface to meet contract requirements. The interface sheets, which the Contractor develops, shall be used as a basis to establish the Interface Specification. Any revision to the Interface Specification shall be mutually agreed between the Contractor and Interfacing Contractors, with submission to the **PM**, and shall specifically -

a) Understand the design requirements of each party and associated constraints;
b) Determine the detailed interface works to be performed during the various stages and
c) Agree on the interface works in reference to respective scope, with any agreements reached to be formally documented in Interface Minutes of Meetings, including an actions item list.

6.5.2 The Interface Contractors shall mutually identify and agree the Interfaces that will exist between them using the Interface Co-ordination Sheets, the format of which is contained in **Attachment F part 1**. These interfaces shall be expanded, if required, to include all, and any other, interfaces that develop during the execution of the Project.

6.5.3 The Interfacing Contractors shall mutually agree upon the information to be exchanged and shall develop a unique Interface Specification for each interface identified. A sample Interface Specification Pro forma is provided in **Attachment C**.

The **ICS**s will be tracked and monitored using an **ICS** Register to be compiled by the Contractor. This register will track the progress of the **ICS** from inception through to closure and final processing by the Contractor, prior to transmittal to the PM as a complete Integrated Design.

Each interface shall have a unique reference number to enable the Interface to be readily identified and tracked and monitored.

6.6 Contractor's Submissions

6.6.1 On commencement of the contract, Master Interface Matrix (MIM) and the Interface sheets in the Contract Documents shall be used as the reference documents from which the Contractor develops his Interface Management Plans (**IMP**) and Interface Management Programme (**IMPG**). The Contractor has to provide to the **PM** the following, as per the due date(s) mentioned below.

a) **CV** of **CIC** subject to Notice of No Objection by **PM** (30 days)
b) Interface Management Plan (**IMP**) (45 days)
c) Interface Management Programme (**IMPG**) 3 month rolling program updated monthly (45 days)
d) Interface Co-ordination Sheets (**ICS**) – monthly progress report pertaining to interface matters (45 days)
e) Confirmation of Co-ordination form (45 days)
f) Interface specification (45 days)

6.6.2 The **PM** shall review the Contractor's interface submissions and issue Notice of No Objection for those sections that comply with the contractual requirements of Interface Management and recommend changes to any sections that do not meet Employer's Requirements. The Master Interface Log (**MIL**) is updated by **PM/GCIM (IST)** with the sections of the Contractor's **IMPG** that receive a Notice of No Objection. A sample Master Interface Log example is provided in **Attachment D**.

6.6.3 To receive a Notice of No Objection, the Contractor's Interface Management Programme (**IMPG**) and Interface Management Plan (**IMP**) shall meet the Employer's requirements on Interface Management - **Appendix 19** of Section VI A.

6.6.4 The **PM/GCIM** is responsible for the overall implementation and maintenance of the interface management process throughout the project life cycle by developing and implementing interface management work processes, capturing the necessary interface agreements, monitoring progress, ensuring that schedule requirements are maintained and pointing out any change requests that may arise out of interface requirements.

6.7 Monitoring the Progress of Interface Agreements

6.7.1 The Chief Interface Coordinator (**CIC**) of the Lead Contractor convenes regular Interface Meeting with the Interfacing Contractor to progress the Interface issues by keeping track of activities required to be performed towards facilitating the needed exchange of information. The Lead Contractor writes the Minutes of Meeting, actions oriented and systematically review the last Minutes of Meeting to confirm agreement, check progress, prior to examining new items.

6.7.2 The **PM/GCIM** (**IST TL**) and his delegates monitor the status of the interface agreements on a regular basis by having periodical (weekly or monthly) meetings with the concerned persons. The Interface Agreements with a `Critical' rating are prioritized and rigorously monitored.

6.7.3 When the Interfacing Contractor receives the requested information by the required date and considers it acceptable, to close a particular interface item/location Lead Contractor will record in the confirmation of co-ordination form for the interfacing element and send it to the Interfacing Contractor/s for agreement. The mutually agreed Interface Specification is then submitted to **PM** for Notice of No Objection.

6.7.4 To close a particular significant phase or portion, Lead Contractor will record in the Interface Specification document and send it to the Interfacing Contractor's for agreement. The mutually agreed Interface Specification is then submitted to **PM** for Notice of No Objection. If **PM** raises any objection, the Lead Contractor re-works the Interface Specification document, in consultation with the Interfacing Contractor, and re-submits to **PM** for Notice of No Objection. After issue of Notice of No Objection, the Interface Agreement is recorded as `closed' in the Interface Databases of both the Contractors as well as in the **MIL**. The closed interfaces are omitted from future interface agreement reporting.

6.7.5 The **PM/GCIM** shall prepare Status Reports from the Master Interface Log (**MIL**) on the progress of the Interface Agreements as part of the Monthly Progress Reports to the **Employer**.

6.7.6 **PM/GCIM** shall check the physical interfaces on site as necessary to make sure that they are progressing according to the agreements made by the Interfacing Contractors and report to the **PM/GCIM**.

7 INTERFACE CO-ORDINATION SHEET (ICS)

7.1 The Contractor's Interface Co-ordination sheet, the format of which is shown in **Attachment F** – Part 1, is required to be used by each of the Interfacing Contractors to record all of the Contract Interfaces. The Contractor shall ensure that each Interfacing Contractor provides input and maintains the **ICS** continually updated as required in this **Appendix 19**.

7.2 The Contractor shall ensure that the Interfacing Contractors demonstrate their co-ordination efforts as required by the Contract. To achieve this, the Contractor and the Interfacing Contractors shall identify their interface requirements which shall be input into the interface documents i.e. **IMP**, **IMPG**, **ICS** etc. by the Contractor.

7.3 The Contractor shall monitor the **ICS** to ensure that, as the Interface progresses, the records show the appropriate Status (refer status codes indicated in Part 3 of **Attachment F**) as agreed with the Interfacing Contractors. The Contractor will be responsible for confirming the "Closing Out" of each **ICS** record, whilst ensuring that throughout the interface process all Interfacing Contractors have agreed to the following:

a) The receiving Interfacing Contractor has received and accepted the Interface being recorded.
b) All Interfacing Contractors have recorded the interface record as "Proposed Close Out".
c) The Confirmation of Co-ordination form in **Attachment G** has been updated and signed by the relevant Interfacing Contractors, refer clause 7.4 below.

7.4 When documents are exchanged for review/comment with Interfacing Contractors, the originator preparing these documents should ensure that they are accompanied by the Confirmation of Co-ordination form in **Attachment G**. When the Interfacing Contractor returns these documents with comments to the originator, they should be returned with the Confirmation of Co-ordination form duly completed, confirming co-ordination and agreement or comment as appropriate, as a record of them having coordinated the interface item. This Confirmation of Co-ordination is to be transmitted to the **PM,** upon signing by the Interfacing Contractor(s), for Notice of No Objection with the appropriate Template **Attachment H**- Review and Comment on all Design / Interface Submittals. The Rank (B, Ma, Mi) is categorised into blocked, major & minor categories.

7.5 The **PM** will obtain approval from **MMRC** on every Main Feature of the final designs / drawings with respect of the following "Approval for Notice of No Objection".

8 CO-ORDINATION DRAWINGS

8.1 General

For the purpose of achieving a Project which is fully co-ordinated with respect to civil, structural, architectural, building services, electrical, mechanical works and interface elements, and to ensure compatibility between different facilities and services, and adequate space requirements, all drawings are to be reviewed and co-ordinated by the Civil Work Contractor.

The Civil Work Contractor will provide and issue detailed Interface Working Drawings in terms of items such as; special arrangements, space allocation, cast in items, primary and secondary fixings, grouting of equipment/plinths, drill and fix brackets, embedded and cast-in items and the like.

The drawings shall be prepared by the Civil Work Contractor, reviewed and validated by the Contractor for its own Interface in accordance with the ICS. The Civil Work Contractor shall also include composite cross-sections and layouts, which show the spatial requirements of all Interfacing Contractors and identify items to be finalised, defined, or resolved.

8.2 Combined Services Drawing (CSDs) And Structural E&M Drawings (SEMs)

The Civil Work Contractor's **CSD**s and **SEM**s must be clear and sufficiently detailed to unambiguously show the intent of the subject services and the corresponding structure / facility allowances. While these drawings do not have to duplicate all of the details of the Drawings, they must include plans sections and elevations as required to clearly illustrate the compatible relationship between the different disciplines. Specifically, the drawings will include wall elevation drawings at 1:50 scale (or larger where required) indicating all openings, access panels, reinforcement zones, embedded and cast-in items and the like, and shall be submitted to the **PM** for a Notice of No Objection.

The **CSD**s shall show the intended locations, routes and spatial relationships of the individual **E&M** services, Building Services systems, and installations, Depot Equipment, Core Systems installations and other installations, fully co-ordinated with each other and the civil structural and architectural work. The **CSD**s shall also clearly indicate that effective cable co-ordination has been achieved in terms of cable location or cable trays and the trunking and cable routing.

The **SEM**s shall show all civil, structural, and architectural requirements for the **E&M** services, Building Services systems and installations, Builder's works and the Core Systems and other installations.

Where Builder's works are required by the Interfacing Contractors, the drawings, details, specification notes and catalogue information and the like shall be obtained by the Civil Work Contractor from these Interfacing Contractors indicating the builder's work to be incorporated into the Works. The Civil Work Contractor shall include details of such Builder's works in the **SEM**s and Method Statements as appropriate.

Builder's work comprises, but is not limited to, the following:

a) Construction of plinths, bases, builders bund walls and the like;
b) Placing and fixing of holding down bolts, lifting beams and hooks and other supporting items;
c) Supply, fabrication installation, protection, fixing and finishing of supporting steelwork, for equipment and associated accessories;
d) Casting in of edgings, angles in recesses, ducts, conduit, pipes etc;
e) Fixing equipment and associated, brackets, cable containment and fixtures;
f) Forming of penetrations, sleeves, access panels, holes, chases, recesses, openings in accordance with the Civil Work Contract.

The **CSD**/**SEM**s shall also be used for the purpose of co-ordinating with the Interfacing Contractors and shall be continuously updated to reflect the latest interface co-ordination. Copies of the **CSD**/**SEM** drawings shall be included in submittals to the **PM** (and **GCIM**/**RE**).

Where the **CSD**s or **SEM**s do not fully co-ordinate with the Site conditions the Civil Contractor shall co-ordinate and propose a solution to the problem. All proposed solutions shall be issued to the PM as Project Manager.

8.3 Interface Drawings

For the Interface Drawings, the Contractor shall prepare in diagrammatic format for each interface the demarcation of scope of responsibilities between the Contractor and each of the Interfacing Contractors. The Contractor shall submit all Drawings with interface requirements for a Notice of No Objection from the PM. Any proposed deviation to the Construction Specification or Drawings shall be identified and justified with design documentation, details and drawings. The submission shall also identify all interface requirements. The contractor should develop own interface drawings with detailed design and dimensions and submit the same to other interfacing contractor.

8.4 As Constructed Drawings

Upon completion of the Works the Civil Work Contractor shall submit all Combined Services Drawings, Structural **E&M** Drawings, and Interface Demarcation Drawings showing the final "As Constructed" status of the Works related to these drawings.

9 ATTACHMENTS

Attachment A - Flow Chart for creation / elaboration of Interface Co-ordination Sheet

Attachment B - Flow Chart for Progress Monitoring of Interface Agreements

Attachment C - Interface Specification Form

Attachment D - Master Interface Log (MIL) – Example

Attachment E - Master Interface Matrix (MIM)

Attachment F Part 1 - Interface Co-ordination sheet - Example

Attachment F - Interface Co-ordination Sheet – Contract Codes

Attachment F Part 3 - Interface Co-ordination Sheet – Status Codes

Attachment G - Confirmation of Co-ordination Form

Attachment H - Review and Comment on all Design / Interface Submittals Template

Attachment K - Guidance Notes for the Preparation of Interface Management Programme

Attachment L - Guidance Notes for the Preparation of Interface Management PlanAttachment M – Interface Sheet (Template)

Attachment N –Indicative Interface Sheets List for contract MM3-CBS-DEM

N1. Indicative Interface Sheet for Depot E&M (DEM) and Civil Depot (CWD)

N2. Indicative Interface Sheet for Depot E&M (DEM) and Rolling Stock (RST)

N3. Indicative Interface Sheet for Depot E&M (DEM) and Overhead Contact System (OCS)

N4. Indicative Interface Sheet for Depot E&M (DEM) and Power Supply System (PSS)

N5. Indicative Interface Sheet for Depot E&M (DEM) and Signaling Train Control, PSD & Telecom (STPT)

N6. Indicative Interface Sheet for Depot E&M (DEM) and Depot Equipment (DEQ)

N7. Indicative Interface Sheet for Depot E&M (DEM) and Lifts (LIF –L1)

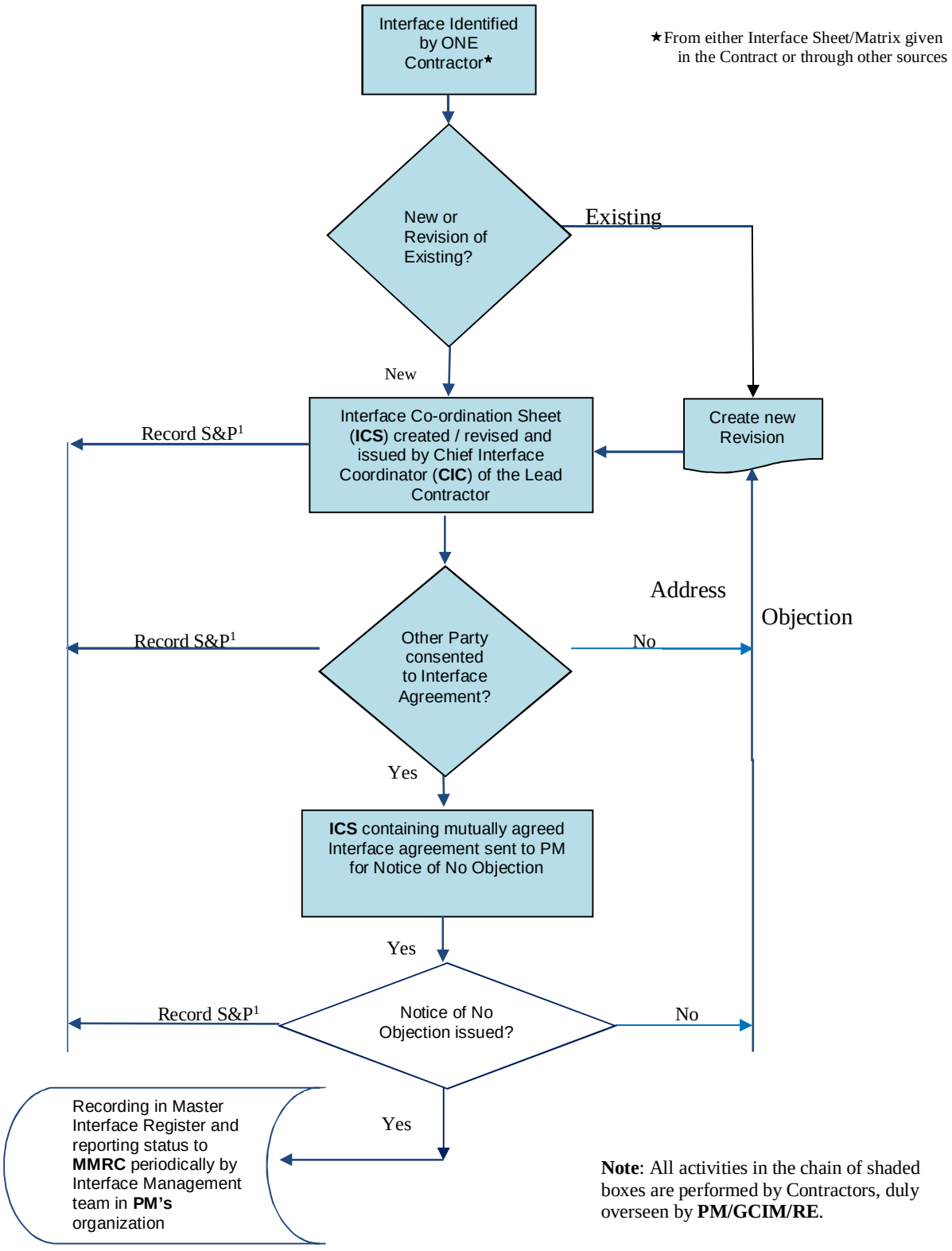
N8. Indicative Interface Sheet for Depot E&M (DEM) and Automatic Fare Collection (AFC)

N9. Indicative Interface Sheet for Depot E&M (DEM) and Escalators (EST-E1)

N10. Indicative Interface Sheet for Depot E&M (DEM) and Tunnel Ventilation & Environment (TVE)

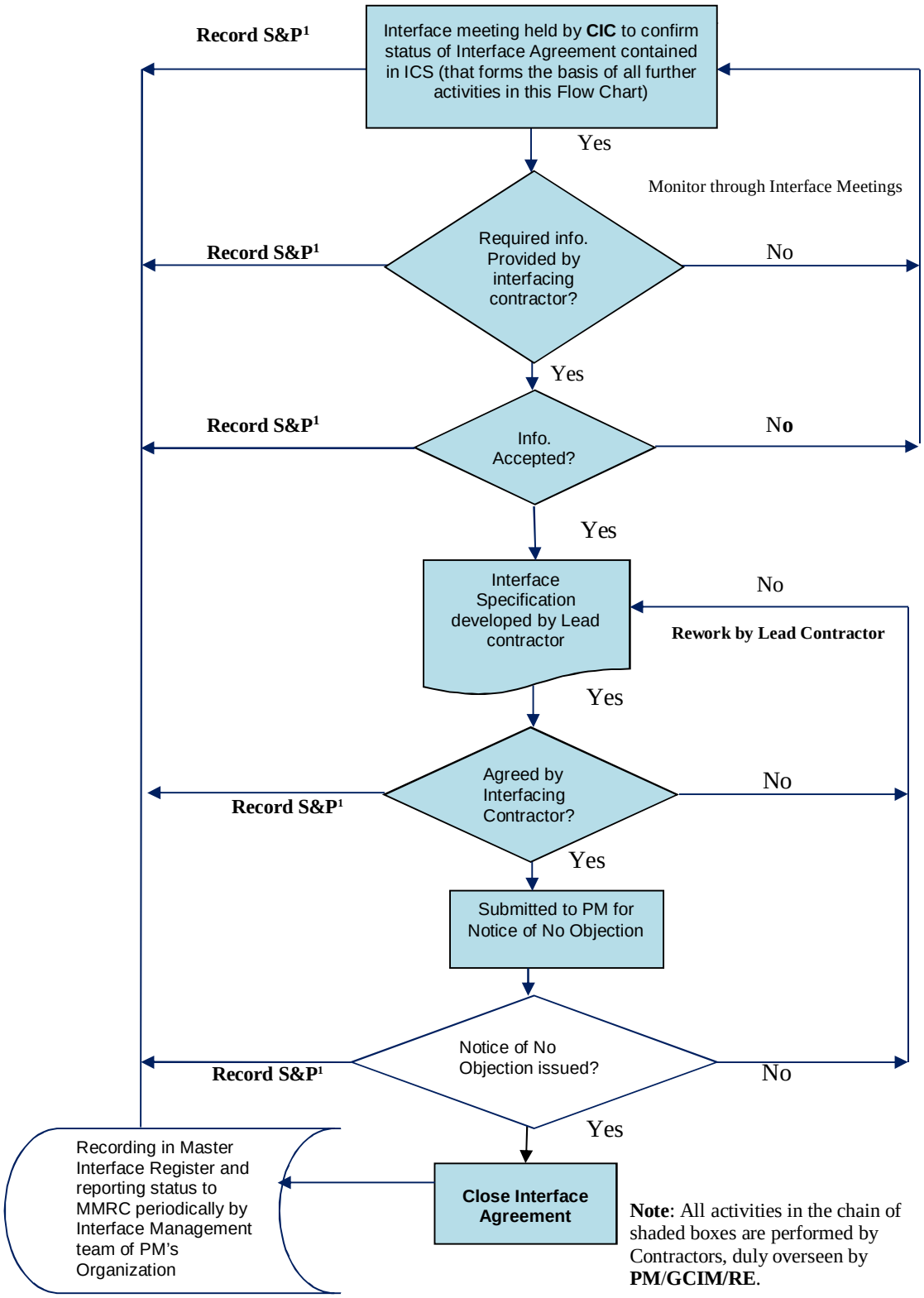
N11. Indicative Interface Sheet for Depot E&M (DEM) and Asset Management Software (AMS)

Attachment A - Flow Chart for creation / elaboration of Interface Co-ordination Sheet



1 = Status and Priority
Ref Attachment F Part 3

Attachment B - Flow Chart for Progress Monitoring of Interface Agreements



1 = Status and Priority
Ref Attachment F Part 3

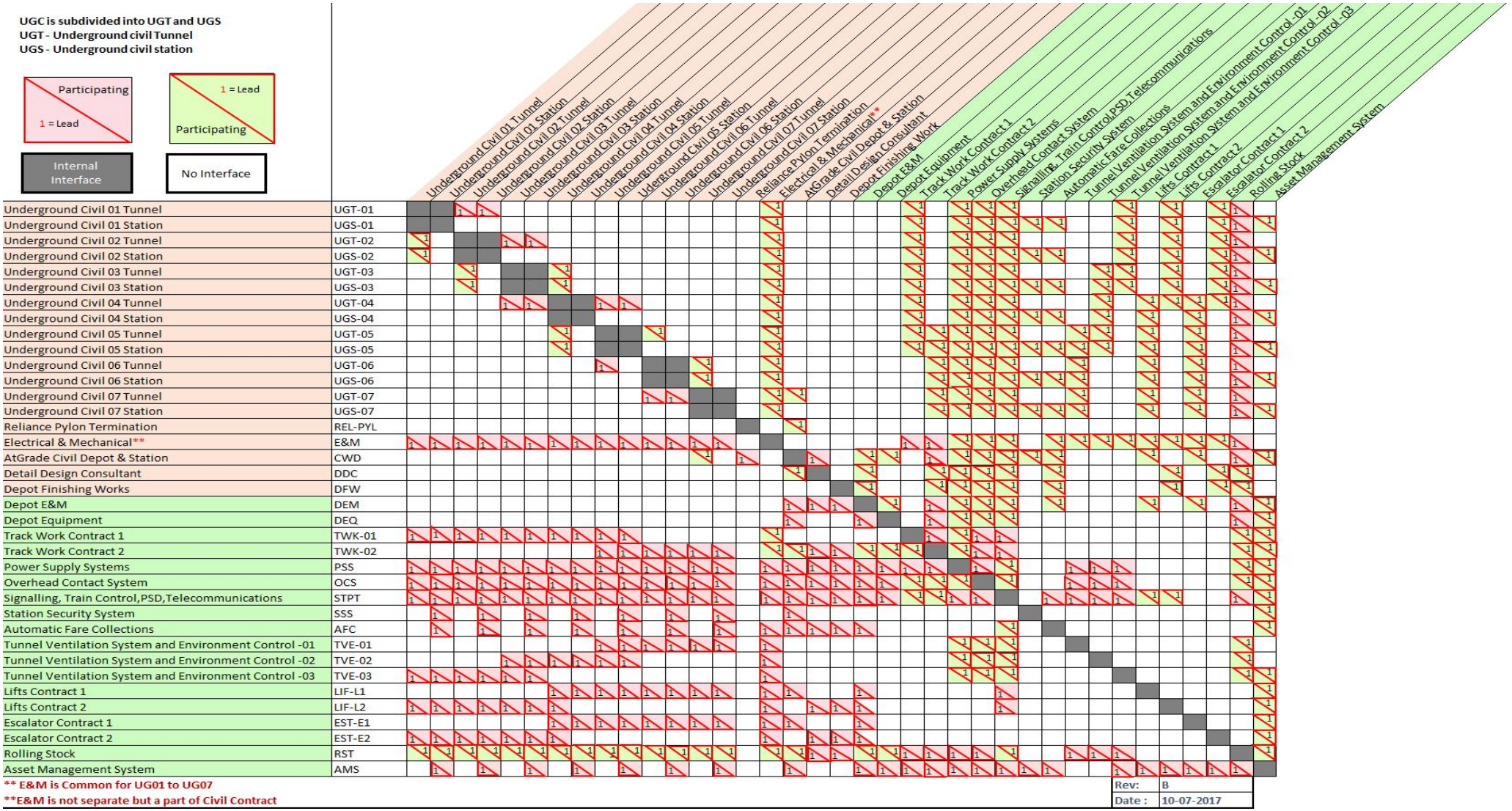
Attachment C - Interface Specification Form

INTERFACE SPECIFICATION			**Ref:** *to create*	
	Contract Designation	**Contractors Sequence Number**	**Date of Issue**	
Initiating Contractor			**Interface Manager Signature**	
Responding Contractor			**Interface Manager Signature**	
Interface Specification Required for;			**Response Required by;**	
Reviewed by;				
Design Sections			**Station Arch. / Building Services**	
Description of the Interface				
Specific Details of the Interface				**Location**
Drawings / Specifications Attached				
Title		**Drawing / Specification Ref.**		**Drawing Issue**
Document	**Name**	**Date**	**Document References (if any)**	
Prepared by:				

Attachment D - Master Interface Log (MIL) - Example

PM Ref. No.	Revision No.	Interface Item No.	Stage	Location	Contract A	Name	Contract B	Name	Status	Remarks
10	A0	UT/US-05	Construction / Installation	Mahalaxmi	Contract UAA-02 shall install cable containment for HV, LV, Signal & telecom and emergency lighting cable routing	UAA-02	Contract UAA-0 shall lay power cable for emergency light and control cable for telephone system from station (controllers will be from Mumbai Central station up to May Day Park shaft)	UAA-01	Pending	
10	A0	UT/US-06	Construction / Installation	Mahalaxmi	Contract UAA-02 shall construct temporary and permanent drainage system and interlink with contract UAA-01 drainage system	UAA-02	Contract UAA-01 shall construct temporary and permanent drainage system and interlink with contract UAA-02 drainage system	UAA-01		
10	A0	UT/US-07	Construction / Installation	BKC	Completion of contract UAA2-02 handover shaft back to UAA-01	UAA-02	Contract UAA-01 shall Jointly inspect and accept the shaft handed over by UAA-02	UAA-01	Completed	
10	A0	UT/US-08	Test & Commissioning	SEEPZ	Alignment of the tunnels, 1st stage concrete in the tunnels to match with the shaft base slab	UAA-02	Agree and accept	UAA-01	Completed	
10	A0	UT/US-09	Maintenance	Santacruz	Stop water leakage between the Shaft wall & tunnels	UAA-02	Joint inspection and accept	UAA-01	Pending	

Attachment E - Master Interface Matrix (MIM)



Attachment F Part 1 - Interface Co-ordination sheet- Example

Interface Co-ordination Sheet:EAS-05 / AC 01

Elevated stations contractor A
Viaduct Corridor - 1 Contractor B

PROVISIONS AS PER THE INTERFACE SHEET				INTERFACE IMPLEMENTATION	
NO	**Project Stage**	**Interface point-Lead**	**Interface Point- Participating**	**Status**	**Action/Progress records &Follow-ups**
Sheet 2 – MMRC Station					
2	Design Stage	Contractor A (Lead Contract) shall furnish the details of Viaduct Lighting mast locations and loading details to Contractor-B (Lead Contract)	Contract B (Participating Contract) shall collect the loading particulars of Viaduct lighting mast of various locations. Shall design and provide the details of foundations	Pending	**Past Activity** **Activity during the Month** 1 meeting during the Month **Major Decisions** A. Contract A shall fix cable trays by anchor fasteners B. Contract A to submit mutually agreeable method statement by 15th Dec 2010 **Open Issue**
3	Design Stage	Contractor-A(Lead Contract)shall request fitting/mounting arrangements to install cable containment for signal, telecom and LV & Lighting cables	Contractor-B(Participating Contract) shall include in viaduct design	Pending	**Past Activity** 3 Minutes of Meeting **Activity during the Month** 1 meeting 10th December **Major Decisions** A. Contract A shall fix cable trays by anchor fasteners B. Contract A to submit mutually agreeable method Statement by 15th Dec 2010 **Open Issue**

Attachment F - Interface Co-ordination Sheet-Contract Codes

The following table provides the Interfacing Party Contract codes to be used when preparing / updating the Contractors Interface Co-ordination Sheet, which should be prepared on the basis of a separate Excel spreadsheet for each Interfacing Party.

Interface Party Codes	
AFC	Automatic Fare Collection
AMS	Asset Management System
CWD	At Grade Civil Depot& Station
DDC	Detail Design Consultant
DEM	Depot E&M
DEQ	Depot Equipment
DFW	Depot Finising Work
EST-E1	Escalator 01
EST-E2	Escalator 02
LIF-L1	Lift 01
LIF-L2	Lift 02
OCS	Overhead Contact System
PSS	Power Supply System
REL-PYL	Reliance Pylon Termination
RST	Rolling Stock
SSS	Station Security System
STPT	Signalling ,Train control, PSD and Telecom
TVE	Tunnel Ventilation System / Environment Control System (01,02 & 03)
TWK	Track work (01 & 02)
UGC	Underground Civil (01 to 07)

Notes :

1 Depot Equipment may be subdivided into individual items of equipment in which case Contractors will be notified of designated interfacing codes.
2 Other document coding should be in accordance with the requirements of the Contract and as agreed with **PM**.

Attachment F Part 3 - Interface Co-ordination Sheet- Status Codes

The following table describes the Interface Status with codes to be used in preparing /updating the Interface Co-ordination sheet.

Interface Status Codes & Meanings		
Interface Status	**Code for Log**	**Description of Status**
To be coordinated	TBC	Both Contractors' have not agreed the conditions for this interface
Coordinated	COR	Both Contractors' have agreed that the interface is valid
Not coordinated	NCOR	One Contractor does not agree the conditions for this interface
Received	REC	The Contractor responsible for the design/construction element has received the information/documents required
Provided	PRO	The Contractor responsible for providing the information/documents to progress the design/construction element has provided the documents to the Interfacing Party
Accepted	ACP	The Contractor has accepted the proposed Interface Design or Construction element
Not Accepted	NACP	Either of the Contractors have not accepted the proposed Design/Construction element
Propose closeout	PCO	Both Contractors' have accepted the proposed Interface Design or Construction element and no other requirements are outstanding Both Parties can agreed to sign the Confirmation of Co-ordination Form
Closed out	CO	The final Interface Documentation together with Confirmation of Co-ordination Form has been sent to the Interface Co-ordination Manager for closing the interface
Superseded	SUP	The Interface design or construction element has been superseded

Attachment G – Confirmation of Co-ordination Form

Mumbai Metro Rail Project		
Ref No.		
CONFIRMATION OF CO-ORDINATION		
CONTRACT:		**TRANSMITTAL No.:**
TITLE:		
ACTIVITY NO.:		
GENERAL DESCRIPTION:		
SIGNATURE OF INTERFACING CONTRACTORS:		

	Interfacing Contractor	**Authorized Name**	**Signature**	**Date Reviewed**	**Comment**
1					
2					

Signatures above confirm that this design document has been reviewed as part of the co-ordination process.

NOTE: Where Contractors are not in agreement with the details on this submission, they are to comment above and advise the interfacing party in question requesting accommodation of the requirement and advise the PM under separate cover and report progress in Monthly Report / Co-ordination Meetings.

Attachment H-Review and Comment on all Design / Interface Submittals Template

SUBMISSION REVIEW REQUEST No.

SRR of Ref Document

CONTRACT:

Column **"Comment status"** contains **(Open/closed with date) + Rank(B, Ma ,mi)** and is filled in by PM

Interface Reference No.			**Date of submission**	
Type of Reference			**Revision:**	
Subject / Title			**Date of Review**	
	GC Review Status			
Review without objection ☐		**Review without objection, subject to** ☐	**Rejected** ☐	
Reviewer: Date: Signature:			Checker: Date: Signature:	

Column **"Comment status"** contains **(Open/closed with date) + Rank (B, Ma, Mi)** and is filled in by GC

Page No. / Paragraph No.	**GC comments**	**Contractor's Reply**	**Comment status**

Ranks:

1 B – Blocked
2 Ma – Major
3 Mi – Minor

Attachment K - Guidance Notes for the Preparation of Interface Management Programme.

1. The programme shall be prepared and submitted in bar chart format.
2. The bar chart shall be formed by activities grouped by major Zones of Interface.
3. The detail of each bar chart activity shall demonstrate the Contractor's understanding of the scope of work of any Interfacing Contractor who is to supply input to the Contractor, in order for him to achieve an integrated coordinated design.
4. The bars shown on the bar chart shall be annotated with details of the information expected from the Interfacing Contractors and highlight any target dates to receive or produce information.
5. Information relating to contractual milestone dates shall be shown on both the Contractor's and Interfacing Contractor's schedules.
6. The prime purpose of the document is to assist with ensuring that a coordinated design, construction, testing and commissioning is achieved. This document shall be forwarded to Interfacing Contractors for comment and agreement on a regular basis.
7. A complementary table of activities and dates should be prepared for ease of reference.

Attachment L - Guidance Notes for the Preparation of Interface Management Plan.

The purpose of this Plan is to demonstrate how the Contractor proposes to achieve a fully coordinated design, which is compatible with that design carried out by Interfacing Contractors.

This document shall describe each of the component parts, within Zones of Interface, of the design, which require input from Interfacing Contractors. The descriptions should include details relating to the inputs required from both the Contractor and Interfacing Contractor, to achieve a fully coordinated design. The document should also be complementary to the IMPG, which details the proposed schedule and timings of each of the interfacing activities.

This document shall also detail the proposed interfacing requirements to be met by all Interfacing Contractors. The Contractor shall ensure that this document is acceptable to the Interfacing Contractors and that they are able to comply with all of its requirements. This is to be achieved by document exchanges and discussions to achieve agreement of documents.

The Plan shall therefore:

i) Detail each of the component parts of the Project, which require the input of Interfacing Contractors to achieve a coordinated design. It shall describe the various disciplines and detail the technical input from others that will be required to achieve a coordinated design.
ii) Cover the whole duration of the Works and be complementary to the **IMPG**, which details the proposed/agreed schedule and timings.
iii) Be given by the Contractor to other Interfacing Contractors for their information and agreement.
iv) Be developed in association with the process of increasing knowledge of the design and shall reflect the agreements reached by the Contractor and the Interfacing Contractors as the Project progresses. The Plan shall be updated on a quarterly basis to reflect this developing status.

The Status of any interface at any point in time shall be identified by one of the following conditions;

(i) To be co-ordinated

(ii) Co-ordinated
(iii) Not co-ordinated
(iv) Received
(v) Provided
(vi) Accepted
(vii) Not accepted
(viii) Propose closeout
(ix) Closed outSuperseded

Attachment M–Interface Sheet (Template)

Mumbai Metro Interface Sheet	**Contract A (Lead Contract)**	**Name of Contract**	**Contract B(Participating Contract)**	**Name of Contract**	***Sheet # : Number/max***	***Rev : A1*** ***Date :***
Approved by : ((name(s) and signature(s))	*Discipline A*		*Discipline B*		*Last changes :*	
PM issued by :	*Name of writer, position, signature for discipline A*		*Name of writer, position, signature for discipline B*			
PM Checked by :	*Name of checker, DCL, signature for discipline A*		*Name of checker, DCL, signature for discipline B*			
Interface description brief / Key elements (time schedule, physical, functional):						
Contract A(Lead Contract)		**DESIGN STAGE**		Contract B(Participating Contract)		
Title ***Interface A Name/Interface B-Number***: detail ***Interface A Name/Interface B-Number=Number+1***: detail			**Title** ***Interface A Name/Interface B-Number***: detail ***Interface A Name/Interface B-Number=Number+1***: detail			
Reference documents:			*Reference documents:*			
Contract A(Lead Contract)		**CONSTRUCTION / INSTALLATION STAGE**		Contract B(Participating Contract)		
Interface A Name/Interface B-Number=Number+1: detail			***Interface A Name/Interface B-Number=Number+1***: detail			
Reference documents:			*Reference documents:*			
Contract A(Lead Contract)		**TEST & COMMISIONNING STAGE**		Contract B(Participating Contract)		
Interface A Name/Interface B-Number=Number+1: detail			***Interface A Name/Interface B-Number=Number+1***: detail			
Reference documents:			*Reference documents :*			
Contract A(Lead Contract)		**MAINTENANCE STAGE**		Contract B(Participating Contract)		
Interface A Name/Interface B-Number=Number+1: detail			***Interface A Name/Interface B-Number=Number+1***: detail			
Reference documents:			*Reference documents :*			

Attachment N - Indicative Interface Sheets for Contract MM3-CBS-DEM

SL NO	Description
N1	Indicative Interface Sheet for Depot E&M (DEM) and Civil Depot (CWD)
N2	Indicative Interface Sheet for Depot E&M (DEM) and Rolling Stock (RST)
N3	Indicative Interface Sheet for Depot E&M (DEM) and Overhead Contact System (OCS)
N4	Indicative Interface Sheet for Depot E&M (DEM) and Power Supply System (PSS)
N5	Indicative Interface Sheet for Depot E&M (DEM) and Signaling Train Control, PSD & Telecom (STPT)
N6	Indicative Interface Sheet for Depot E&M (DEM) and Depot Equipment (DEQ)
N7	Indicative Interface Sheet for Depot E&M (DEM) and Lifts (LIF –L1)
N8	Indicative Interface Sheet for Depot E&M (DEM) and Automatic Fare Collection (AFC)
N9	Indicative Interface Sheet for Depot E&M (DEM) and Escalators (EST-E1)
N10	Indicative Interface Sheet for Depot E&M (DEM) and Tunnel Ventilation & Environment (TVE)
N11	Indicative Interface Sheet for Depot E&M (DEM) and Asset Management Software (AMS)

N1. Indicative Interface Sheet for Depot E&M (DEM) and Civil Depot (CWD)

Mumbai Metro Interface Sheet	**Contract A**	**CWD**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***09/01/***
Approved by *:*	**Depot Civil Works(CWD)** Lead Contract		**DEM (DEM Stations)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

General Interface details between Civil work Depot(CWD) and DEM Stations(DEM)		
Contract A(CWD-DDC)	**DESIGN STAGE**	Contract B(DEM)
CW/DEM-01:Shall provide the E&M requirement in the architectural drawings.		**CW/DEM-01**: Shall advice to Contract "A" regarding E&M requirement such as required cutout, sleeves, wall opening for all MEP services to be provided in architectural and structural design at Depot and Array Station.
CW/DEM-02: Shall coordinate and provide requirement of Contract "B" in drawings		**CW/DEM-02**: Ensure all the required cut outs, sleeves and other provisions for E&M services as VAC, Fire Fighting, cable trays, etc. are in place as per the drawing and requirement.
CW/DEM-03: Shall include Contract "B" requirement in the civil drawings.		**CW/DEM-03**: Shall advice the required trench layout for electrical cables with three types of trenches, one for HT cables, one for LT cables, and one combined for both LT & HT cables (required number of trenches will be designed considering minimum 750mm horizontal sufficient space for installation and maintenance works) pipe lines, etc. for various E&M services to be provided in the civil drawings.

Mumbai Metro Interface Sheet	Contract A	CWD	Contract B	DEM	*Rev # :*	*A1*
					Date:	*09/01/*
CW/DEM-04: Shall incorporate Contract "B" requirement in his false ceiling design. (Reflected Ceiling Plan).			**CW/DEM-04**: Shall provide required drawings to Contract "A" of lighting fixture mouting/fixing details, layout & design, fire alarm &fire fighting equipment's location, VAC equipments etc.			
CW/DEM-05: Shall incorporate Contract "B" E&M equipment loads in Structural design.			**CW/DEM-05:** Shall submit the E&M equipment's loads (weight) details and GAD to Contract "A".			
CW/DEM-06: Shall incorporate and provide the lifting hooks / chain pulley with rail arrangement for other E&M services as required.			**CW/DEM-06**: Shall submit the lifting hook, chain pulley with rail arrangement details / load requirements for all MEP services to Contract "A".			
CW/DEM-07: Shall incorporate foundation for Transformers, DG's, Compressor, VAC equipment, Firefighting pumps and other E&M equipment as required.			**CW/DEM-07**: Shall provide the Dimensional and load (in kgs / ton) details of E&M to Contract "A".			
CW/DEM-08: Shall design and construct the fire water tank, raw water tank and treated water tank.			**CW/DEM-08**: Shall coordinate and provide water requirement for fire fighting system, raw water and treated water to Contract "A".			
CW/DEM-09: Cable trench and manholes with top cover should be provided by civil. (RCC for External Trenches and Steel for Internal Trenches).			**CW/DEM-09**: Shall advice Contract "A" the E&M requirement with trench and manhole layout plan, etc. details and drawings.			
CW/DEM-10: Shall coordinate & provide Contractor "B" requirement			**CW/DEM-10**: Closing and sealing of cable trench at entry / exit point of trench / manholes to the building from external trench.			
CW/DEM-11: Shall provide the I/O points on open protocol for plumbing pumps, STP & ETP equipments, control panels, etc to Contract "B".			**CW/DEM-11**: Shall integrate with Depot E&M SCADA or BMS System.			

Mumbai Metro Interface Sheet	**Contract A**	**CWD**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***09/01/***
CW/DEM-12: Shall provide electrical power requirement for ETP, STP to Contract "B" for designing power distribution.			**CW/DEM-12**: Shall design and incorporate in the electrical distribution the requirements of Contract "A".(only power cables)			
CW/DEM-13: Shall co-ordinate & provide area required for earthing, the Soil resistivity report, etc. for Earth Mat Design.			**CW/DEM-13**: Shall advice to Contract "A" Earth mat area and shall design the Earth Mat in coordination with Civil Contractor.			
CW/DEM-14: Shall provide the Earthing and Bonding Details for Civil and Steel Structures.			**CW/DEM-14**: Shall advice to Contract "A" E&M Earthing design details requirements.			
CW/DEM-15: Shall provide to Contract "B" wall partition, glass glazing, roof sheeting, etc. specification and other details for designing of VAC works (In room wise matrix form).			**CW/DEM-15**: Shall detail VAC designs as per room detail inputs from Contract "A". (Shall detail A/c, Non A/c rooms etc).			
CW/DEM-16: Over head crane weight shall be incorporated in workshop's structural design as per requirement of contract "B".			**CW/DEM-16**: Shall advice to contact "A" the Overhead Crane details like types, Quantity, Capacity, weight, etc.for incorporation in structural design.			
CW/DEM-17: Shall design pump sizing, rating and head for the water supply pumps, sump pumps, horticulture pupms etc.			**CW/DEM-17**: Shall incorporate and design Control panel and electrical distribution system accordingly.			
Contract A(CWD)		**CONSTRUCTION / INSTALLATION STAGE**		Contract B(DEM)		
CW/DEM-18:Shall provide the Contract "B" requirements / details as mentioned under Design Stage above.			**CW/DEM-18**: Shall coordinate, verify and submit acceptance to Contract "A" works.			

Mumbai Metro Interface Sheet	**Contract A**	**CWD**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***09/01/***
CW/DEM-19:Shall share and incorporate the E&M requirements in the architectural false ceiling drawings			**CW/DEM-19**:Shall coordinate and advice with Contract "A" for requirement.			
CW/DEM-20:Shall provide the space for installation of raceways before finished flooring works.			**CW/DEM-20**:Shall install the required raceways before flooring works.			
CW/DEM-21:Shall install aligned Steel Girders for Overhead crane long travel movement.			**CW/DEM-21**:Shall verify the requiremets provided by contract "A".			
CW/DEM-22:Shall advice to Contract "B" the installation instructions for welding rails and all other peripheral accessories for Overhead Crane operations.			**CW/DEM-22**:Shall follow the advice of Contract "A" for completion of welding works for Crane operations.			
CW/DEM-23:Fixing work of Supporting arrangement for High Bay/Medium Bay Lighting to be provided.			**CW/DEM-23**:Shall arrange Lighting luminaires etc. with fixing arrangement.			
CW/DEM-24:Excavation and closing of area identified for earth mat will be done by Contract "A" in coordination with Contract "B".			**CW/DEM-24**:Shall share the design details of earth mat for excavation and cloaing of pits to Contract "A".			
CW/DEM-25:Contract "A" shall provide three types of cable trench with cover for electrical cables (first for onlyLT cables, second for only HT cables and third for both HT & LT combined), pipe lines, and Drainage lines for various MEP services in Depot to be provided in the civil drawings.			**CW/DEM-25**:Shall coordinate and advice to Contract "A"the requirements			
CW/DEM-26: Shall provide piping network for water supply system, strom water drainage system, horticulture sypply system and coordinate with contract "B" in installation of pumps.			**CW/DEM-26**:Shall provide water supply pumps, sump pumps, horticulture pupms etc. as requirement of Contract "A".			

Mumbai Metro Interface Sheet	**Contract A**	**CWD**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***09/01/***
Reference documents:			Reference documents:			
Contract A(CWD)		**TEST & COMMISSIONING STAGE**		Contract B(DEM)		
CW/DEM-27: Contract "A" shall conduct test run jointly with Contract "B" corrective works in the profile wherever necessary.			**CW/DEM-27**: Contract "A" shall conduct test run jointly with Contract "B"			
Reference documents :			Reference documents:			
Contract A(CWD)		**MAINTENANCE STAGE**		Contract B(DEM)		
NIL			**NIL**			
Reference documents:			Reference documents:			

N2. Indicative Interface Sheet for Depot E&M (DEM) and Rolling Stock (RST)

Mumbai Metro Interface Sheet	**Contract A**	**RST**	**Contract B**	**DEM**	***Rev #***	***A1***
					Date	***14/07/17***
Approved by *:*	**RS (Rolling Stock)** (Lead Contract)		**DEM (Depot E&M)** (Participating Contract)		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

General Interface details between the RS (Rolling stock) and DEM (Depot E&M).

Contract A (RST)	**DESIGN STAGE**	Contract B (DEM)
RS/DEM-01: **Power supply requirements and Electrical load for Simulator** - Shall provide details of power supply and electric load requirements for Simulator.		**RS/DEM-01**: Shall provide lighting, air- conditioning and power sockets in the Simulator room. Shall provide conduits/ race ways for power supply.
RS/DEM-02: Fire safety requirements for Simulator room -Shall interface with Depot E&M for fire safety requirements.		**RS/DEM-02:** Shall provide Fire detection and suppression system in the Simulator room.
RS/ DEM-03: **Air conditioning requirements for Simulator room** - Provide details of the heat load.		**RS/DEM-03**: Shall provide the Air conditioning system for Simulator room to achieve the designed room environment condition.
Reference documents*:*		Reference documents*:*

Contract A (RST)	**CONSTRUCTION / INSTALLATION STAGE**	Contract B (DEM)
NIL		**NIL**

Mumbai Metro Interface Sheet	**Contract A**	**RST**	**Contract B**	**DEM**	***Rev #***	***A1***
					Date	***14/07/17***
Reference documents:			Reference documents:			
Contract A (RST)		**TEST & COMMISSIONING STAGE**		Contract B (DEM)		
NIL			**NIL**			
Reference documents :			Reference documents*:*			
Contract A (RST)		**MAINTENANCE STAGE**		Contract B (DEM)		
NIL			**NIL**			
Reference documents:			Reference documents:			

N3. Indicative Interface Sheet for Depot E&M (DEM) and Overhead Contact System (OCS)

Mumbai Metro Interface Sheet	**Contract A**	**DEM**	**Contract B**	**OCS**	***Rev # :***	***A2***
					Date	***27/04/17***
Approved by *:*	**DEM (Depot E&M)** Lead Contract		**OCS (Overhead Contact System)** Participating Contract		Last changes: 1 item is replaced and 1 is additional.	
					Contract A	**Contract B**
GC issued by :					08	-
Checked by :					**Additional item:**	08(A)

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Overhead Contact System (OCS) vs Depot E&M

Contract A(Depot E&M)	**DESIGN STAGE**	Contract B(OCS)
DEM/OCS-01: Shall design E&M equipment for the depot traction switching station including lighting, LV power distribution, ventilation, fire detection and fire suppression		**DEM/OCS-01**: Shall provide the room size and equipment layout for the depot traction switching station to Contractor A to design the E&M equipments.
DEM/OCS-02: Shall prepare the combined services drawings for Aarey station considering the requirements of Contract-B.		**DEM/OCS-02**: Shall provide the requirements of cable trays / brackets for 33 kV cables and Control cables in Aarey station to Contract-A.
DEM/OCS-03: Shall provide ACDB alongwith dedicated circuit breakers to supply LV power requirements of contract-B equipment in Depot Traction switching station room..		**DEM/OCS-03:** Shall provide the LV power requirements of his equipment in Depot Traction switching station room.

Mumbai Metro Interface Sheet	**Contract A**	**DEM**	**Contract B**	**OCS**	***Rev # :***	***A2***
					Date	***27/04/17***
DEM/OCS-04: Shall provide dedicated circuit breakers in ACDB & DCDB in Depot ASS-1 & 2 to supply the power requirements of 25 kV motorised disconnect switches in depot.			**DEM/OCS-04:** Shall provide the requirements of 240 V AC and 110 V DC power supply for 25 kV motorised disconnect switches in depot to Contract A.			
Reference documents*:*			Reference documents*:*			
Contract A(Depot E&M)		**CONSTRUCTION / INSTALLATION STAGE**	Contract B(OCS)			
DEM/OCS-05: Shall provide and install E&M equipment in depot traction switching station.			**DEM/OCS-05**: Shall coordinate with Contract-A to insure that the requirements are met.			
DEM/OCS-06: Shall provide cable trays / brackets for 33 kV cables and control cables in Aarey station.			**DEM/OCS-06**: Shall supply and install 33 kV cables and control cables in Aarey station.			
DEM/OCS-07: Shall provide and install earth mat and provide risers to the earthing bus in Aarey station and the depot traction switching station room.			**DEM/OCS-07:** Shall jointly check the earth resistance of the earth mat in Aarey station and the depot traction switching station.			
DEM/OCS-08: Shall provide an ACDB in Depot traction switching station room and install the AC cables from Depot ASS to the Depot traction switching station room to supply the LV power requirements of Contract B.			**DEM/OCS-08:** Shall supply and install cables from ACDB to his euipments in depot traction switching station room.			
DEM/OCS-08(A): Shall provide dedicated circuit breakers in DCDB in Depot ASS-1 & 2 to supply 110 V DC power requirements of 25 kV motorised disconnect switches in depot.			**DEM/OCS-08(A):** Shall provide and install the 110 V DC power supply cables from DCDB in Depot ASS1 and ASS2 to 25 kV pole mounted disconnect switches in the Depot.			

Mumbai Metro Interface Sheet	**Contract A**	**DEM**	**Contract B**	**OCS**	***Rev # :***	***A2***
					Date	***27/04/17***
Contract A(Depot E&M)		**TEST & COMMISSIONING STAGE**		Contract B(OCS)		
DEM/OCS-09: Contract-A shall measure the earth resistance value at Aarey station ASS and Depot traction switching station to verify that it is less than 1 ohm.			**DEM/OCS-09:** Contract-B shall jointly witness the earth mat resistance test at Aarey station ASS and Depot traction switching station.			
Reference documents :			Reference documents*:*			
Contract A(Depot E&M)		**MAINTENANCE STAGE**		Contract B(OCS)		
NIL			**NIL**			
Reference documents:			Reference documents:			

N4. Indicative Interface Sheet for Depot E&M (DEM) and Power Supply System (PSS)

Mumbai Metro Interface Sheet	**Contract A**	**DEM**	**Contract B**	**PSS**	***Rev # :***	***A1***
					Date	***27/04/2017***
Approved by :	**DEM (Depot E&M)** Lead Contract		**PS (Power Supply System)** Participating Contract		**Last changes** :1 item is replaced & 2 items are additional.	
					Contract A	**Contract B**
GC issued by :					04(A)	04(A)
Checked by :					**Additional item:**	04(B) , 04(C)

General Interface details between the Depot E&M & Power Supply System

ContractA DEM (Depot E&M)	**DESIGN STAGE**	**Contract B PS (Power Supply System)**
DEM/PS-01: Contract-A shall provide the auxiliary power requirement and corresponding power factor in the Depot.		**DEM/PS-01**: Contract-B shall use the auxiliary power requirement and corresponding power factor in the Depot to conduct the 33kV AC load flow study.
DEM/PS-02: Contract-A shall provide the I/O list of equipment in Depot ASS-1 and ASS-2.		**DEM/PS-02:** Contract-B shall design and provide the RTU's with associated cables for Depot ASS-1 & ASS-2.
DEM/PS-03: Contract-A shall design the 110 V DC battery and battery charger in Depot ASS-1 and ASS-2 to cater for the control power requirements of SCADA RTU.		**DEM/PS-03**: Contract-B shall provide the 110 V DC control power requirements of RTU in Depot ASS-1 and ASS-2.
DEM/PS-04: Contract-A shall use the maximum fault current provided by Contract-B to design the earth mat for Aarey station ASS and Depot traction switching station.		**DEM/PS-04**: Contract-B shall specify the maximum fault current at Aarey station ASS and Depot traction switching station.
Reference documents*:*		Reference documents :

Mumbai Metro Interface Sheet	**Contract A**	**DEM**	**Contract B**	**PSS**	***Rev # :***	***A1***
					Date	***27/04/2017***
ContractA DEM (Depot E&M)		**CONSTRUCTION / INSTALLATION STAGE**			**Contract B PS (Power Supply System)**	
DEM/PS-04 (A): Contract-A shall provide the 110 V DC and 240 V AC power supply cables at RTU in Depot ASS-1 And ASS-2.			**DEM/PS-04(A)** : Contract-B shall terminate the 110 V DC and 240 V AC power supply cables at RTU in Depot ASS-1 and ASS-2.			
DEM/PS-04 (B): Contract-A shall provide the requirement of status & control points in his equipment in Depot ASS-1 & Depot ASS-2.			**DEM/PS-04(B):** Contract-B shall provide the control cables from RTU to Contract-A equipment in Depot ASS-1 & Depot ASS-2.			
DEM/PS-04 (C) : Contract-A shall provide terminal blocks for terminating the control cables from RTU to his equipment in Depot ASS-1 & Depot ASS-2.			**DEM/PS-04(C) :** Contract-B shall terminate the control cables from RTU at Contract-A equipment in Depot ASS-1 & Depot ASS-2.			
Reference documents*:*			Reference documents *:*			
ContractA DEM (Depot E&M)		**TEST & COMMISIONNING STAGE**			**Contract B PS (Power Supply System)**	
DEM/PS-05: Contract-A shall assist Contract-B for testing and commissioning of SCADA system for ASS equipment.			**DEM/PS-05:** Contract-B shall coordinate with Contract-A for testing and commissioning of SCADA system for ASS equipment.			
Reference documents *:*			Reference documents *:*			
ContractA DEM (Depot E&M)		**MAINTENANCE STAGE**			**Contract B PS (Power Supply System)**	
NIL			**NIL**			
Reference documents:			Reference documents :			

N5. Indicative Interface Sheet for Depot E&M (DEM) and Signaling Train Control, PSD & Telecom (STPT)

Mumbai Metro Interface Sheet	**Contract A**	**STPT**	**Contract B**	**DEM**	***Rev # :***	***A5***
					Date:	***21/07/2017***
Approved by *:*	**STPT (Signaling & Train Control, Platform Screen Doors and Telecommunication Systems)** Lead Contract		**DEM (Depot E&M)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Signaling & Train Control, Platform Screen Doors and Telecommunication Systems (STPT) and Depot E&M (DEM)

2. The DEM contractor (Contract B) shall install M&E SCADA for Aarey station & BMS System for Depot Building.

Contract A (STPT)	**DESIGN STAGE**	Contract B (DEM)
ST/DEM 1a: Shall furnish requirement for cable routing conduits, trays and ladders.(inside all buildings only) **ST/DEM 1b:** Shall furnish requirement for normal and essential (DG) power along with Earthing requirement for STPT equipment's in Depot & Areay Station. **ST/DEM 1c:** Shall furnish requirement of very essential power (UPS) along with earthing requirement for PSD (door only) at Aarey station. **ST/DEM 1d:** Contractor A shall review CSD for approval.		**ST/DEM 1a,b&c:** Shall incorporate in the system the requirement of STPT Contractor for cable routing, embedded conduits, cable trays, power (normal, essential and very essential) & Earthing. **ST/DEM 1d:** Shall submit to Contractor A, CSD for agreement.
ST/DEM 2a: Shall furnish details of heat dissipation & Air-conditioning (Temperature + Humidity) requirement of STPT equipments installed. **ST/DEM 2b:** CER room shall be with bottom cooled arrangement.		**ST/DEM 2a:** Shall design Cooling system according to Heat dissipation of S&T Contractor. **ST/DEM 2b**: Air-conditioning of CER shall be designed and provided with precision type air conditioning system.

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEM	*Rev # :*	*A5*
					Date:	*21/07/2017*
ST/DEM 2c: Shall review AC technical specification for approval of STPT portion only.			**ST/DEM 2c:** Shall submit to contractor A, AC technical specification for agreement.			
ST/DEM 3a: Shall furnish the room wise equipment layout and lighting requirements in the STPT rooms. **ST/DEM 3b:** Shall furnish the room wise equipment layout and fire suppression requirement in the STPT rooms. (Gas Suppression System) **ST/DEM 3c:** Shall review proposed design by Contractor B for approval of STPT portion only.			**ST/DEM 3a:** Shall design the system such that adequate lighting is provided in the rooms. **ST/DEM 3b:** Shall design the system such that adequate fire suppression is provided in STPT rooms. **ST/DEM 3c:** Shall submit to Contractor A proposed design for agreement.			
ST/DEM 4: Shall furnish the requirements of lightning surge protection of different STPT systems to be installed.			**ST/DEM 4:** Shall validate and integrate the lightning surge protection systems in his detailed designs.			
ST/DEM 5: Shall furnish the EMI/EMC levels of STPT equipments in the rooms and the yard..			**ST/DEM 5:** Shall incorporate the STPT requirements and shall prepare a common EMI/EMC plan.			
ST/DEM 6a: Shall furnish the requirements of earthing arrangement including earth impedance values for different STPT systems to be installed in S&T UPS Room, SER, TER, CER, DCC, OCC theater. **ST/DEM 6b:** Shall jointly design the interfacing of Fire Protection System with PAS to provide automatic evacuation announcement based on Fire Alarm Zone **ST/DEM 6c:** Shall jointly design the interfacing of Fire Protection System with PAS to automatic muting of FPS sounder during PAS announcement. **ST/DEM 6d**: Shall jointly design muting of PA speakers near fire panel when the microphone is switched ON for announcements.			**ST/DEM 6a:** Shall provide the earthing arrangement for different systems and extend it up to S&T UPS Room, SER, TER, CER, DCC and OCC theatre and in individual equipment rooms. (clean earth not exceeding 0.5ohm) and (main earth not exceeding 1.0 ohm). **ST/DEM 6b:** Shall jointly design the interfacing of Fire Protection System with PAS by ST to provide technical specification of Fire system to ST. **ST/DEM 6c:** Shall jointly design the interfacing of Fire Protection System with PAS by ST and provide the relevant technical specification of Fire system to ST **ST/DEM 6d:** Shall jointly design muting of Fire Sounders near fire panel when the microphone is switched ON for announcements.			

Mumbai Metro Interface Sheet	**Contract A**	**STPT**	**Contract B**	**DEM**	***Rev # :***	***A5***
					Date:	***21/07/2017***
ST/DEM 6e: Shall review all above requirement according the proposed design by Contractor B for approval of STPT portion only.			**ST/DEM 6e**: Shall submit to Contractor A all above proposed design for agreement.			
ST/DEM 7a: At Depot - Shall design the Ethernet LAN connectivity for Depot BMS systems to suit their requirement and their connectivity to DCC and BMS room at ground floor of OCC & Admin Building..			**ST/DEM 7a: At Depot -** Shall define the control/monitoring requirements and parameter measurements of Depot BMS systems and OCC Admin building BMS systems locations for Ethernet LAN connectivity. Shall Design Local control panel, installation & wiring for it and shall provide necessary Interface devices for compatabity to connect to switch ports.			
ST/DEM 7b: **At Aarey Station -** Shall design the M&E SCADA to suit the requirement of controlled and monitored E&M equipments/systems to be installed by DEM contractor at Aarey station			**ST/DEM 7b**: **At Aarey Station** - DEM contractor shall define the control & monitoring requirements and parameter measurements. DEM contractor shall install the local control panel (LCP) and wire it to devices.			
ST/DEM 7c: **At Aarey Station** - Shall design and validate the Ethernet LAN connectivity requirements from the Interface devices in Aarey station to the SCR of Aarey station, OCC & BCC.			**ST/DEM 7c**:**At Aarey Station** - Shall design the interface devices for each monitoried /controlled E&M equipment of Aarey station for connectivity to LAN installed by STPT.			
ST/DEM 7d: **At Aarey Station** - Shall design the HMI for M&E SCADA at the SCR,OCC & BCC to meet the control & monitoring requirement of E&M equipments installed by DEM contractor at Aarey station			**ST/DEM 7d**: **At Aarey Station** - Shall advise the locations and Ethernet connectivity requirement of Interface device associated with E&M equipments to be monitored & controlled by M&E SCADA.			
Contract A (STPT)		**CONSTRUCTION / INSTALLATION STAGE**		Contract B (DEM)		
ST/DEM 8: Shall check if required power load parameters along with Earthing is installed by E&M mentioned under design stage			**ST/DEM 8:** Shall install and supply required power load along with proper Earthing for STPT equipments mentioned under design stage.			
ST/DEM 9: Shall check & inspect compliance of Ventilation and Air Conditioning requirements for STPT equipment are met.			**ST/DEM 9:** Shall install proper Air-conditioning and ventilation system to meet STPT requirement.			

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEM	*Rev # :*	*A5*
					Date:	*21/07/2017*
ST/DEM 10a: Shall confirm location of lighting keeping in mind proper visibility & Fire suppression arrangement with respect to equipment locations. **ST/DEM 10b:** Shall connect PAS at OCC/CER/ DCC/ with Fire system			**ST/DEM 10a:** Shall Install the lights, Fire Suppression system in accordance with requirement specified above by STPT. **ST/DEM 10b:** Shall connect Fire system at OCC/CER/ DCC/ with PAS			
ST/DEM 11: Shall provide, install and fix all STPT equipment, including cables with connections to individual devices.			**ST/DEM 11:** Shall provide and install the required cable conduits, trays and ladders. Shall provide the necessary support to contractor A during installation of STPT equipment.			
ST/DEM 12: Shall plan and coordinate the installation of STPT equipment with the progress of depot works, in accordance with global depot coordination.			**ST/DEM 12:** Shall Plan and coordinate the progress of depot works with the progress of STPT equipment installation in the depot.			
ST/DEM 13: Shall install STPT UPS power cables from the distribution panel (in STPT UPS room) to all concerned rooms. Shall also arrange for distribution of power supply to all field STPT equipments.			**ST/DEM 13**: Shall provide and install incomer for STPT UPS main switch in STPT UPS room with necessary tray/conduit as per STPT routing and mounting of cables.			
ST/DEM 14: Shall install the PA system, CCTV system and telephone for the OCC/DCC areas as well as the depot area.			**ST/DEM 14:**Shall monitor and ensure that the requirements of cable tray and conduits are met.			
ST/DEM 15: Shall extend the FOTS-FO, FOTS-IP to all buildings in the depot area and terminate at a central distribution point in each building. Shall provide communication backbone to contract -B			**ST/DEM 15**: Shall facilitate routing Shall extend network to his LAN/Devices in buildings.			
ST/DEM 16: Shall install the Access control system and intrusion detection system.			**ST/DEM 16:** Shall provide and install necessary concealed conduits/tray to install the Access control system and intrusion detection system STPT contractor			

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEM	*Rev # :*	*A5*
					Date:	*21/07/2017*
ST/DEM 17: Shall install the equipments at OCC, Depot and Aarey station like staff protection keys locks, emergency stop plungers, PIDS, PA system, Clocks, CCTV, cameras and TV equipment etc.			**ST/DEM 17:** Shall provide and install necessary conduits/tray as required for STPT contractor.			
ST/DEM 18: Shall lay all necessary SIG cables in depot, station and other areas			**ST/DEM 18:** Shall provide and install cable containments/cable hangers fixings as per requirements.			
ST/DEM 19: Shall furnish cable routing plan to Contractor B for PSD			**ST/DEM 19:** Shall provide and install embedded conduits, cable trays/ ladders, UPS power and earthing for PSD.			
ST/DEM 20: **At Depot** - Shall provide and install LAN connectivity for all controlled & monitored systems installed by DEM contractor in the depot buildings.			**ST/DEM 20**: **At Depot** - Shall install the BMS system at all depot buildings. The DEM contractor shall wire and connect upto the LAN ports provided by STPT for various BMS systems.			
ST/DEM 21: **At Aarey Station** - Shall provide & install LAN connectivity up to interface device for all controlled & monitored systems installed by DEM contractor at Aarey station.			**ST/DEM 21**: **At Aarey Station** - Shall install the M&E equipments in Aarey station. The DEM contractor shall wire and connect the interface devices upto the LAN port provided by STPT for various E&M equipments of Aarey station..			
ST/DEM 22: **At Aarey Station** - Shall install the M&E SCADA system at the OCC, BCC & SCR for Aarey station and provide Ethernet LAN connectivity up to interface devices for all controlled & monitored systems installed by DEM contractor at Aarey station.			**ST/DEM 22**: **At Aarey Station** -Shall provide and install, wire and connect the interface device upto the station LAN port provided by STPT contractor for E&M equipments/ systems at Aarey station.			
Contract A (STPT)		**TEST & COMMISSIONING STAGE**		Contract B (DEM)		
ST/DEM 23: Shall jointly test with E&M contractor if Earthing to S&T is proper along with Power load distribution and sign the test document jointly.			**ST/DEM 23:** Shall jointly check if power load & Earthing requirements are fulfilled as per STPT requirement and jointly sign the test document			

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEM	*Rev # :*	*A5*
					Date:	*21/07/2017*
ST/DEM 24: Shall check the cooling and ventilation is proper as per STPT requirements mentioned in design stage. & jointly sign the test document.			**ST/DEM 24:** Shall jointly take part in test and jointly sign the test document			
ST/DEM 25a: Shall conduct joint testing on the ST networking, **ST/DEM 25b**: Shall conduct joint testing on the STPT UPS, **ST/DEM 25c:** Shall conduct joint testing on the lighting system **ST/DEM 25d:** Shall conduct joint testing on the building management systems for backbone connectivity.			**ST/DEM 25:** Shall attend the joint testing and validate the test results			
ST/DEM-26: Shall conduct the joint testing and confirm that there are no EMI / EMC impacts on STPT equipments installed in Aarey stations and Depot.			**ST/DEM-26:** Shall attend the joint testing with STPT contractor			
ST/DEM-27a: Shall jointly test Depot PAS with Depot Fire system and show this interface in Depot PAS O&M Manual **ST/DEM-27b:** Shall jointly test Station PAS with Station Fire system and show this interface in Aarey PAS O&M Manual			**ST/DEM 27a:** Shall jointly test Fire system with PAS **ST/DEM 27b:** Shall jointly test Fire system with PAS			
ST/DEM-28: STPT Contractor shall jointly develop with E&M contractor the STPT Maintenance Plan and Maintenance Manual for efficient						

Mumbai Metro Interface Sheet	Contract A	STPT	Contract B	DEM	*Rev # :*	*A5*
					Date:	*21/07/2017*
future Operation and Maintenance for items mentioned in above three stages.			**ST/DEM 28:** E&M Contractor shall jointly develop with STPT contractor the E&M Maintenance Plan and Maintenance Manual for efficient future Operation and Maintenance for items mentioned in above three stages.			
ST/DEM 29: **At Depot** - Shall attend the joint testing with 'DEM' for testing of the LAN connectivity for BMS equipment systems provided under the 'Contract B' of Depot buildings including DCC and BMS room at ground floor of OCC Admin building.			**ST/DEM 29**: **At Depot** - Shall conduct the joint testing of LAN connectivity by STPT and validate the test results.			
ST/DEM 30: **At Station** - Shall conduct joint testing as per control logic & display format with 'DEM' for testing of the networking, monitoring & control of M&E equipment systems provided at Aarey station through the M&E SCADA LAN & HMIs provided by the STPT contractor from SCR and OCC and from SCR and BCC.			**ST/DEM 30**: **At Station** - Shall attend the joint testing and validate the test results.			
Contract A (STPT)		**MAINTENANCE STAGE**		Contract B (DEM)		
ST/DEM 31: Shall Finalise the joint maintenance procedures and periodicity of joint inspection between- M&E SCADA and station M&E equipments/power supply system/lighting systems etc. which are part of building management functions.			**ST/DEM 31**: Shall validate the joint maintenance procedure and test plans prepared by 'Contract A'			

N6. Indicative Interface Sheet for Depot E&M (DEM) and Depot Equipment (DEQ)

Mumbai Metro Interface Sheet	**Contract A**	**DEQ**	**Contract B**	**DEM**	***Rev #***	***: A0***
					Date	***31/08/2017***
Approved by *:*	**Depot Equipment (DEQ)** Lead Contract		**DEPOT E&M (DEM)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Depot Equipment Contractor (DEQ) and Depot E&M Works Contractor (DEM)

Contract A (DEQ)	**DESIGN STAGE**	**Contract B (DEM)**
DEQ /DEM-01: Shall provide the requirements of total Electrical Power (starting and full load currents, kilowatts, lighting, Earthing, Cable Routing & location of the power point (Isolator) for various Depot Equipments like Automatic Train Washing Plant, Mobile lifting jacks, Railcar lifting system (Pit Jacks), Under floor wheel lathe along-with Chip crusher, conveyor, Train Shunter, Bogie Testing Bench and Other Equipments (as applicable).		**DEQ /DEM-01:** Shall collect and design the load details from "Contract A" w.r.t the requirements of power and earthing, Cable routing, isolator's, circuit breakers, lighting and other electrical/mechanical requirements Power incomer cable and earthing up to & with main switch in DEM electrical panel only. "Contract A" shall extend from this point to respective depot equipments.
DEQ /DEM-02: Shall provide the architectural/ structural/ fixing 'general arrangement drawing' of Depot Equipments (as applicable).		**DEQ /DEM-02:** Shall incorporate Contractor-A's requirement in his design w.r.t DEM works only.
DEQ /DEM -03: Shall provide the interface details of fire detection and firefighting system needed inside the Train Wash Plant, UFWL and other Depot Equipments (as applicable).		**DEQ /DEM -03:** Shall collect the details from Contractor-A. And utilize the input for fire protection system as well as provide functional requirements under various emergency conditions.

Mumbai Metro Interface Sheet	**Contract A**	**DEQ**	**Contract B**	**DEM**	***Rev #***	***: A0***
					Date	***31/08/2017***
DEQ /DEM-04: Provide details of cast in conduits/race ways from Depot Equipment control panel to Equipments.			**DEQ /DEM-04:** Shall provide cable tray / conduit / trunking control panel to Depot Equipment control panel.			
Reference documents*:*			Reference documents*:*			
Contract A (DEQ)		**CONSTRUCTION / INSTALLATION STAGE**		**Contract B (DEM)**		
DEQ /DEM-05: Shall jointly check the availability of requirements for Depot Equipments installation, like Power Supply, lighting, Earthing Cable routing, power supply Isolator points, as per the drawing (provided by DEQ) suitable for DEQ erection and confirm.			**DEQ /DEM-05:** Shall provide 'Contractor A' requirements in Depot Facility.			
DEQ /DEM-06: Shall jointly check the cast in conduits/race ways from Depot Equipment control panel to Equipments.			**DEQ /DEM-06:** Shall provide cable tray / conduit / trunking control panel to Depot Equipment control panel.			
DEQ /DEM-07: Shall coordinate and confirm 'Contractor B' executions in Depot with respect to fire detection & firefighting system for equipment viz. i.e. UFWL, Train Wash Plant and other Depot Equipments (where required)			**DEQ /DEM -07:** Shall provide and install Fire detection & firefighting system in the Equipments Pits for UFWL, Train Wash Plant Control Room / Equipments Controller Cabinet and connection to Main Station Fire detection system.			
Reference documents:			Reference documents:			
Contract A (DEQ)		**TEST & COMMISSIONING STAGE**		**Contract B (DEM)**		
DEQ /DEM-08 : Contract-A Shall Conduct test run jointly with Contractor-B			**DEQ /DEM-08:** Contractor-B shall co-ordinate with Contractor-A			
Reference documents :			Reference documents*:*			

Mumbai Metro Interface Sheet	**Contract A**	**DEQ**	**Contract B**	**DEM**	***Rev #***	***: A0***
					Date	***31/08/2017***
Contract A (DEQ)			**MAINTENANCE STAGE**		**Contract B (DEM)**	
DEQ /DEM-09: Shall jointly prepare Maintenance Plan as per the maintenance manual supplied by supplier and agreed by all the parties.			**DEQ /DEM-09:** Shall jointly prepare Maintenance Plan as per the maintenance manual supplied by supplier and agreed by all the parties.			
Reference documents:			Reference documents:			

N7. Indicative Interface Sheet for Depot E&M (DEM) and Lifts (LIF –L1)

Mumbai Metro Interface Sheet	**Contract A**	**LIF-L1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
Approved by *:*	**LIF-L1 (Lift)** Lead Contract		**DEPOT E&M (DEM)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Lift (LIF-L1) vs.Depot E&M (DEM)

Contract A (LIF-L1*)*	**DESIGN STAGE**	**Contract B (DEM)**
LIF/DEM-01: Shall provide the requirements of total Electrical Power (Normal, DG and UPS), Earthing, Cable Routing & location of the power point (Isolator) for Lifts in the Depot Buildings and Aarey station.		**LIF/DEM-01:** Shall collect the load details and give input to power supply (PST) contractor to select the capacity of Transformer (ASS). Shall design the earthing (from earth pit to respective equipment room), Cable routing and isolators locations as per the requirements for Lifts. and **:**Shall incorporate in design details the electrical power requirements of Contract A
LIF/DEM-02: (a) Shall provide the interface details of Fire alarm system inside the lift to Contract-B. (b) Shall implement functional requirements in software.		**LIF/DEM-02:** (a)Shall collect the details from Contract-A and utilize the input for fire Alarm system (b) Shall provide functional requirements under various emergency conditions
LIF/DEM-03: To furnish the design and power requirement for Remote Monitoring System (RMS) and cables requirements to the following said area as mentioned below. a)to Station Control Room (SCR) of Aarey Station		**LIF/DEM-03:** Provide necessary UPS power supply requirement of Contract A for Remote Monitoring System (RMS). Provide Cables and Cable Containment for feeding the each Lifts to respective said areas as mentioned below shall coordinate Contract-A's requirement.

Mumbai Metro Interface Sheet	**Contract A**	**LIF-L1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
b)BMS Control room in Depot			a)to Station Control Room (SCR) of Aarey Station b)to BMS Control room in Depot			
Reference documents*:*			Reference documents*:*			
Contract A (LIF-L1)		**CONSTRUCTION / INSTALLATION STAGE**		**Contract B (DEM)**		
LIF/DEM-04: Shall jointly check the availability of requirement for Lifts installation, like Permanent Power Supply, Earthing Cable routing, power supply Isolator points as per the drawing (provided by Lift Contractor) suitable for lifts erection and confirm.			**LIF/DEM-04:** Shall provide 'Contract A' requirements in Depot Buildings and Aarey station.			
LIF/DEM-05: Shall coordinate and confirm 'Contract B' executions in Depot Buildings and Aarey station.			**LIF/DEM-05:** Provide lift shaft with fire/smoke protection measures			
LIF/DEM-06: To furnish the Installation, Testing & Commissioning of Remote Monitoring System (RMS) and laying of cables to respective locations			**LIF/DEM-06:** Provide necessary UPS power supply connection for Remote Monitoring System (RMS) and Shall coordinate Contract-A's requirement in respective locations.			
Reference documents:			Reference documents:			
Contract A (LIF-L1)		**TEST & COMMISSIONING STAGE**		**Contract B (DEM)**		
LIF/DEM-07: Contract-A Shall Conduct test run jointly with Contract-B			**LIF/DEM-07:** Contract-B shall co-ordinate with Contract-A.			
Reference documents :			Reference documents*:*			
Contract A (LIF-L1)		**MAINTENANCE STAGE**		**Contract B (DEM)**		

Mumbai Metro Interface Sheet	**Contract A**	**LIF-L1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
LIF/DEM-08: As per the maintenance manual supplied by supplier and agreed by all the parties.			**LIF/DEM-08:** As per the maintenance manual supplied by supplier and agreed by all the parties			
Reference documents:			Reference documents:			

N8. Indicative Interface Sheet for Depot E&M (DEM) and Automatic Fare Collection (AFC)

Mumbai Metro Interface Sheet	**Contract A**	**AFC**	**Contract B**	**DEM**	***Rev # :***	***A0***
					Date:	***06/07/17***
Approved by *:*	**Automatic Fare Collection (AFC)** Lead Contract		**Depot E&M (DEM)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Depot E&M (DEM) and Automatic Fare Collection (AFC)

Contract A(AFC)	**DESIGN STAGE**	Contract B(DEM)
AFC/DEM -01: AFC Contractor will submit the Heat Dissipation list of AFC Equipments only.		**AFC/DEM -01**: E&M Contractor should cover the Air Conditioning requirements of AFC contractor.
AFC/DEM -02: AFC Contractor will define the location of Exhaust Fan in all AFC rooms.		**AFC / DEM -02:** E&M Contractor should cover, the Exhaust Fan requirements of AFC contractor in all AFC rooms.
AFC/DEM -03: All Rooms for the AFC system the Lighting Lux Levels should not less than Minimum level value of (350 Lux).		**AFC / DEM -03**: E&M Contractor should cover, the Lux Level in all AFC rooms according to the requirement.
AFC / DEM -04: AFC Contractor request to Connect the Electronic (Clean) earthing by insulated Cable connections according to the Standard in all AFC rooms and All AFC Equipments.		**AFC/ DEM -04:** E&M Contractor should cover the Electronic (Clean) earthing requirements of AFC contractor as per the E&M Technical Specification (0.5 ohms) for all AFC rooms. Earth Terminal in rooms under the Circuit Breaker to Electric Cabinet will be done by AFC contractor.
AFC/DEM-05: AFC Contractor will define/provide/cover the Power Socket, Quantity and Specific requirements in AFC rooms and for All AFC Equipments.		**AFC/DEM-05:** E&M shall assist Contract A

Mumbai Metro Interface Sheet	Contract A	AFC	Contract B	DEM	*Rev # :*	*A0*
					Date:	*06/07/17*
AFC/DEM-06: All AFC rooms should be covered by Smoke Detector and should be installed in all AFC rooms.			**AFC/DEM-06:** E&M Contractor should cover, the Smoke Detector in all AFC rooms according to the E&M Technical Specifications.			
AFC/DEM-07: All AFC electro-mechanical system (TVM's and AFC Gates) should be connected to the E&M UPS system and this is for not less than Two hours (3 Phase Neutral + Earth). For Aarey Station ticket reader on platform and concourse level should be covered for cabling and cable trays. For AFC PTR Room and AFC workshop room in Infrastructure Maintenance Building.			**AFC/DEM-07:** E&M Contractor should cover in E&M-UPS capacity the AFC contractor requirements. The Connection from feeder to electromechanical Circuit Breaker in AFC rooms is the responsibility of Contractor B and the connection from the Circuit Breaker to the AFC Electric Cabinet, is the responsibility Contractor A.			
AFC/DEM-08: AFC Contractor will submit the equipment electrical load data to E&M contractor for cabling works. (3 phase Neutral + Earth).			**AFC/DEM-08:** E&M Contractor should cover in cabling works the AFC contractor requirements including cable with MCB installed in Ticket Office Room (TOM) at Aarey station and in AFC rooms at Depot Workshop and admin building.			
AFC/DEM-09: AFC contractor will define quantity, sizing and routing for suspended cable trays, junction boxes and embedded conduits / raceways in civil flooring under the AFC gates, TVM's, Ticket Office Room and Telecom Equipment Room to be provided according to the requirement.(in Aarey Station and in Depot workshop and admin Building).			**AFC/DEM-09:** E&M Contractor should cover in cable tray, junction boxes works, embedded conduits / raceway works the AFC contractor requirements.			
AFC/DEM-10: 1.) Shall design the AFC system (Only for Aarey Station) to interface with Fire Alarm System. Shall also specify the details like type of signal, communication protocol, etc.			**AFC/DEM-10:** 1.) Shall design the Fire Alarm system (Only for Aarey Station) to interface with AFC system. Shall verify and accept mutually the details like type of signal, communication protocol, etc. operation in emergency condition.			

Mumbai Metro Interface Sheet	Contract A	AFC	Contract B	DEM	*Rev # :*	*A0*
					Date:	*06/07/17*
2.) Shall design the software according to functional requirements in emergency condition and degraded modes.			2.) Shall specify the functional requirements of AFC system.			
Reference documents :			Reference documents:			
Contract A(AFC)		**CONSTRUCTION / INSTALLATION STAGE**		**Contract B(DEM)**		
AFC/DEM-11: AFC contractor shall jointly witness with the E&M contractor the Installation works and takeover the works mentioned under Design Stage for onward AFC contractor works.			**AFC/DEM-11:** E&M contractor should supply and install AFC requirements mentioned under Design Stage and put to AFC contractor for witness, approval and acceptance.			
Reference documents :			Reference documents:			
Contract A (AFC)		**TEST & COMMISSIONING STAGE**		**Contract B(DEM)**		
AFC/DEM-12: AFC Contractor should submit to E&M contractor the Testing and Commissioning requirements for items mentioned under Design, Supply and Construction Stage.			**AFC/DEM-12:** E&M Contractor should comply and assist to AFC contractor for the required Testing and Commissioning for works mentioned under Design, Supply and Construction Stage under Contractor B responsibility.			
Reference documents :			Reference documents:			
Contract A (AFC)		**MAINTENANCE STAGE**		**Contract B(DEM)**		
AFC/DEM-13: AFC Contractor should jointly develop with E&M contractor the AFC Maintenance Plan and Maintenance Manual for efficient future Operation and Maintenance for items mentioned in above three stages.			**AFC/DEM-13:** E&M Contractor should jointly develop with AFC contractor the E&M Maintenance Plan and Maintenance Manual for efficient future Operation and Maintenance for items mentioned in above three stages.			
Reference documents :			Reference documents:			

N9. Indicative Interface Sheet for Depot E&M (DEM) and Escalators (EST-E1)

Mumbai Metro Interface Sheet	**Contract A**	**EST-E1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
Approved by *:*	**EST-E1 (Escalator)** Lead Contract		**DEPOT E&M (DEM)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Escalator (EST-E1) vs.Depot E&M (DEM) (Areay Station)

Contract A (EST-E1*)*	**DESIGN STAGE**	**Contract B (DEM)**
EST/DEM-01: Shall provide the requirements of total Electrical Power (Normal, DG and UPS), Earthing, Cable Routing & location of the power point (Isolator) for Escalators in the station.		**EST/DEM-01:** Shall collect the load details and give input to power supply (PST) contractor to select the capacity of Transformer (ASS). Shall design the earthing (from earth pit to respective equipment room), Cable routing and isolators locations as per the requirements. and **:**Shall incorporate in design details the electrical power requirements of Contract A
EST/DEM-02: Shall provide interface details of sprinkler system inside Escalator to Contract-B		**EST/DEM-02:**Shall collect details from Contract-A and design his system accordingly
EST/DEM-03: To furnish the design and power requirements for Remote Monitoring System (RMS) and cables requirements to Station Control Room (SCR) of Aarey Station		**EST/DEM-03:** Provide necessary UPS power supply requirement of Contract A for Remote Monitoring System (RMS). Provide Cables and Cable Containment for feeding the each Escalators to Station Control Room (SCR) of Aarey Station

Mumbai Metro Interface Sheet	**Contract A**	**EST-E1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
Reference documents*:*			Reference documents*:*			
Contract A (EST-E1)		**CONSTRUCTION / INSTALLATION STAGE**		**Contract B (DEM)**		
EST/DEM-04: Shall jointly check the availability of requirement for Escalators installation like Permanent Power Supply, Earthing Cable routing, power supply Isolator points as per the drawing (provided by Escalator Contractor) suitable for Escalators erection and confirm.			**EST/DEM-04:** Shall provide 'Contract A' requirements in station Building.			
EST/DEM-05: Shall coordinate and confirm 'Contract B' executions in station Buildings			**EST/DEM-05:** Provide Escalator shaft with fire/smoke protection measures			
EST/DEM-06: To furnish the Installation, Testing & Commissioning for Remote Monitoring System (RMS) and laying of cables to SCR for each Escalators.			**EST/DEM-06:** Provide necessary UPS power supply connection for Remote Monitoring System (RMS) and Shall coordinate Contract-A's requirement in station design.			
EST/DEM-07: Shall request water connection to Escalator sprinkler system.			**EST/DEM-07:** Shall provide the water connection as per the requirements of Contract-A.			
Reference documents:			Reference documents:			
Contract A (EST-E1)		**TEST & COMMISSIONING STAGE**		**Contract B (DEM)**		
EST/DEM-08: Contract-A Shall Conduct test run jointly with Contract-B			**EST/DEM-08:** Contract-B shall co-ordinate with Contract-A.			
Reference documents :			Reference documents*:*			
Contract A (EST-E1)		**MAINTENANCE STAGE**		**Contract B (DEM)**		

Mumbai Metro Interface Sheet	**Contract A**	**EST-E1**	**Contract B**	**DEM**	***Rev #***	***: A1***
					Date	***18/08/2017***
EST/DEM-09: As per the maintenance manual supplied by supplier and agreed by all the parties.			**EST/DEM-09:** As per the maintenance manual supplied by supplier and agreed by all the parties			
Reference documents:			Reference documents:			

N10. Indicative Interface Sheet for Depot E&M (DEM) and Tunnel Ventilation & Environment (TVE)

Mumbai Metro Interface Sheet	**Contract A**	**TVE**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***30/05/17***
Approved by *:*	**Tunnel Ventilation & Environmental** Lead Contract		**Depot E&M** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Tunnel Ventilation & Environmental (TVE-01) and Depot E&M (DEM)

Contract A(TVE)	**DESIGN STAGE**	Contract B(DEM)
At Grade Station Aaray **TVE/DEM -01**: Shall collect the details of equipment heat generation load, number of persons and operating temperature details in the electrical rooms such as low voltage switch gear room , transformer rooms and UPS room etc to design ECS.		**At Grade Station Aaray** **TVE/DEM -01**: Shall provide the details as requested by contractor A.
TVE / DEM -02: Shall collect the details of lighting heat generation load in the station office room to design ECS.		**TVE / DEM -02:** Shall provide the details of lighting heat generation load.
TVE/DEM -03: Shall provide power requirements (Normal ,DG, & UPS) to take three phase and single phase incoming power supply for all ECS equipment. Shall get the location of the Incoming source main distribution board.		**TVE / DEM -03**: Shall provide(Normal, DG & UPS) the three phase and single phase incoming power supply up to the incomer of the relevant distribution board / MCC. Shall also provide the location of Incoming source main distribution board.

Mumbai Metro Interface Sheet	**Contract A**	**TVE**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***30/05/17***
TVE / DEM -03(A): Shall get the cable containment for ECS. **TVE / DEM -03(B):** Shall get the earth bus in the ECS equipment.			**TVE / DEM -03(A):** Shall provide the cable containment for ECS. **TVE / DEM -03(B):** Shall provide the earth bus in the ECS equipment rooms.			
Reference documents :			**Reference documents:**			
Contract A(TVE)		**CONSTRUCTION / INSTALLATION STAGE**		**Contract B(DEM)**		
<u>At Grade Station Aaray</u> **TVE/DEM-04:** Shall check three phase and single phase incoming power supply main distribution board for all ECS equipment.			**<u>At Grade Station Aaray</u>** **TVE/DEM-04:** Shall Co-ordinate with contractor –A			
TVE/DEM-05: Shall check the cable containment works			**TVE/DEM-05:** Shall Co-ordinate with contractor -A			
Reference documents :			**Reference documents:**			
Contract A(TVE)		**TEST & COMMISSIONING STAGE**		**Contract B(DEM)**		
TVE/DEM-06: Shall conduct joint testing on the electrical inputs and outputs operation required for Environmental Control System.			**TVE/DEM-05:** Shall agree and do the needful.			
Reference documents :			Reference documents:			
Contract A(TVE)		**MAINTENANCE STAGE**		Contract B(DEM)		

Mumbai Metro Interface Sheet	**Contract A**	**TVE**	**Contract B**	**DEM**	***Rev # :***	***A1***
					Date:	***30/05/17***
TVE/DEM-06: Shall jointly agree and accept as per the maintenance specification			**TVE/DEM-06:** Shall do the needful as per the maintenance specification of the station and tunnel.			
Reference documents :			Reference documents:			

N11. Indicative Interface Sheet for Depot E&M (DEM) and Asset Management Software (AMS)

Mumbai Metro Interface Sheet	**Contract A**	**AMS**	**Contract B**	**DEM**	***Rev #***	***: A***
					Date	***12/07/2017***
Approved by *:*	**Asset Management System (AMS)** Lead Contract		**Depot E&M (DEM)** Participating Contract		First issue:	
GC issued by :						
Checked by :						

Interface description brief / Key elements (time schedule, physical, functional, ...) :

1.General Interface details between the Depot E&M (DEM) vs.Asset Management System (AMS)

Contract A (AMS)	**DESIGN STAGE**	**Contract B (DEM)**
AMS/DEM-01: Shall provide main Asset Management common platform software and license /licenses to Contract B		**AMS/DEM-01:** Shall ensure DEM Asset data can be communicated with the main Asset Management Common Platform Software using compliant license/licenses with it provided by Assest Management System to fulfill the common template issued by Asset Management System.
Reference documents*:*		Reference documents*:*
Contract A (AMS)	**CONSTRUCTION / INSTALLATION STAGE**	**Contract B (DEM)**
AMS/DEM-02: Shall provide the connectivity arrangements for Asset Management common platform Software at the design locations decided by MMRC..		**AMS/DEM-02:**Shall coordinate and update data inputs on AMS during the installation.
Reference documents:		Reference documents:
Contract A (AMS)	**TEST & COMMISSIONING STAGE**	**Contract B (DEM)**

Mumbai Metro Interface Sheet	**Contract A**	**AMS**	**Contract B**	**DEM**	***Rev #***	***: A***
					Date	***12/07/2017***
AMS/DEM-03: The Contractor shall jointly test the functionality of Asset Management System Software according to the needs of Contract B.			**AMS/DEM-03:**Shall agree and do the needful.			
Reference documents :			Reference documents*:*			
Contract A (AMS)		**MAINTENANCE STAGE**		**Contract B (DEM)**		
AMS/DEM-04: Shall jointly accept and agree as per maintenance specifications.			**AMS/DEM-04:** Shall do the needful as per maintenance specification.			
Reference documents:			Reference documents:			

APPENDIX-08 : POWER OF ATTORNEY

Attention: The Executive Director(Electrical),
MMRC,Street Address: MMRDA ,
Bandra Kurla Complex, Bandra (East),
City: Mumbai, Post Code: 400 051
Country: Republic of India

Mumbai Metro Line 3 (Colaba-Bandra-SEEPZ) Project

Contract MM3-CBS-DEM.

Contract MM3-CBS-DEM: Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

Date: xxxxxxxx, 2017

Place: xxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Know all men by these presents, that I/We _____ (name, title and ID/Passport number of the legal representative), legal representative of_____ _____ (name of Tenderer*/) duly organised and existing under the laws of _____ (name of country) with its main office located at _____ (address of the Tenderer*/) hereby duly authorise and extend complete POWER OF ATTORNEY to Mr./Ms._____ (name, title and passport number of the authorized person) to perform the following functions in the tendering process for Contract Package- **MM3-CBS-DEM** under the Mumbai Metro Line 3 (Colaba-Bandra-SEEPZ) Project being implemented by the Mumbai Metro Rail Corporation Ltd :

1. To sign the Tender;
2. To sign letters and documents for communication with the Employer during the participation in tendering, including the letters of request for clarification of Tender Documents and letters of clarification of the Tender;
3. To participate in contract negotiation and in finalization of the Contract Agreement; and
4. To sign the Contract Agreement with the Employer, if the Contract is awarded to _____ (name of Tenderer*/).

The above authorized person shall perform only the functions within the scope of authorization specified above as a lawful representative of _____ (name of Tenderer*).

_____ (name of Tenderer*/) shall bear full responsibility for the functions performed by the said person within the scope of authorization given to him.

This Power of Attorney shall be effective from _____ (date) to _____ (date) and is made in _____ equally valid copies, of which _____ copies are to be kept by the Principal and one copy by the authorized person.

The Authorized Person	**The Principal**
_____	_____
(name and title)	(name and title of legal Representative of the Tenderer*)
Signature: _____	Signature: _____

Note:

*: or the name of Partner of Joint Venture if the Tenderer is a Joint Venture.

This Power of Attorney shall be certified by a Notary Public.

APPENDIX-22 : Form of Joint Venture/Consortium Agreement

(On a non-judicial stamp paper of INR 500)

Date:_____,2017

Contract MM3-CBS-DEM: Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

Under the MUMBAI METRO LINE 3, (COLABA-BANDRA-SEEPZ) Project

- Pursuant to Invitation for Bids is MM3-CBS-DEM

- Pursuant to the Bidding Documents for the Contract MM3-CBS-DEM: **Design,** Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3", issued in the Notice Inviting Tender (NIT) by Mumbai Metro Rail Corporation Ltd on 24th July 2017.

We, representing the parties to the Joint Venture/Consortium Agreement and consisting of:

Name of Partner *[write the name of each partner]*

Represented by Mr. /Ms.: _____

Position: _____

Address: _____

Telephone: _____

Fax: _____

E-mail: _____

Account: _____

Tax code: _____

Power of Attorney No. _____ dated _____*(in the case of attorney).*

Name of Partner *[write the name of each partner]*

Represented by Mr. /Ms.: _____

Position: _____

Address: _____

Telephone: _____

Fax: _____

E-mail: _____

Account: _____

Tax code: _____

Power of Attorney No. _____ dated _____*(in the case of attorney).*

The parties hereto (hereinafter referred to as "the Partners") agree to sign this Joint Venture/Consortium Agreement with the following contents:

Article 1. General Principle

1. The Partners hereby voluntarily form a Joint Venture/Consortium Agreement for participation in the bidding for Contract MM3-CBS-DEM under the MUMBAI METRO LINE 3, (COLABA-BANDRA-SEEPZ) Project.

2. The Partners agree that the name of the Joint Venture/Consortium to be used for all transactions related to this Contract MM3-CBS-DEM is: _____*[write the agreed name of the joint venture/consortium]*.

3. The Partners pledge that not any partner of this Joint Venture/Consortium will, at its discretion, participate independently or in partnership with other partners in bidding for this Contract MM3-CBS-DEM. In the case where the Contract is awarded to this Joint Venture/Consortium, no partner hereof will have the right to refuse to perform its responsibilities and obligations under this Agreement without the written consent of the other partners in the Joint Venture/Consortium. Should a partner of the Joint

Venture/Consortium refuses to fulfil its own responsibilities in accordance with this agreement, such partner shall:

(Please provide details

Article 2. Sharing of Responsibilities

The Partners agree that each partner hereof shall share the responsibilities to perform the Contract MM3-CBS-DEM as follows:

1. The Lead Partner Role

The Partners agree to give power to _____ *[state the name of the partner]* to be the Lead Partner of the Joint Venture/Consortium, representing the Joint Venture/Consortium in the following activities:

- *To sign the Bid;*
- *To sign letters and documents for communication with the Employer during the bidding process, including the letter of request for clarification of Bid Documents and the letter of explanation and clarification of the Bid;*
- *To participate in contract negotiation process and finalization of Contract;*
- *To sign petitions, if any, for the bidder;*
- *To conduct other works [specify the contents of other works (if any)]…….*

2. *The JV members in compliance with the provisions of Clause 1.11 of GC, Section IV. General Conditions:……..*
3. *The governance structure of JV:……..*
4. *The operational rules and financial management mechanism including that for receipt of payments under the Contract and distribution thereof amongst JV members:……..*
5. *The stakes or percentage participation level of each member:……..*
6. *The dispute resolution mechanism amongst the members:……..*
7. *The distribution of main scope of works to be executed by the respective members (* Bidder's attention is invited to the fact that while describing distribution of the Scope of Works/Activities amongst the JV/Consortium members, it should be kept in view that such distribution respects and matches with the respective technical expertise of each member relating to their past Specific Experience in Key Activities as was claimed by the JV/Consortium under Experience Clause of the tender document for getting prequalified/eligible to tender for the Contract(s). Any distribution of scope amongst JV members that vitiates or is in contrary to the tender submittals/process may lead to the rejection of tender*)……..*

8. The Performance security is to be submitted by the respective JV members of the Contractor in proportion to their percentage shares in this Contract and shall be in the name of joint venture/consortia

Article 3. Effectiveness of Joint Venture/Consortium Agreement

1. This Joint Venture/Consortium Agreement shall take effect from the date of its signing.

2. This Joint Venture/Consortium Agreement shall be terminated in the following cases:

   - The Partners have fulfilled their responsibilities and obligations and have liquidated the Contract;

   - *The Partners agree to terminate this Agreement*;

   - Bidding for Contract MM3-CBS-DEM under the MUMBAI METRO LINE 3, (COLABA-BANDRA-SEEPZ) Project is cancelled as notified by the Employer.

This Joint Venture/Consortium Agreement is made in _____ copies of the same validity, with each party keeping _____ copies.

LAWFUL REPRESENTATIVE OF THE LEAD PARTNER

[specify name and title, sign and seal]

LAWFUL REPRESENTATIVES OF PARTNERS OF THE JOINT VENTURE/CONSORTIUM

[specify name, title, sign and seal

Note: Provide the following to this Form:

1. Where ever the descriptions are in *Italic* the details shall be provided.
2. Attach the Power of Attorney from each partner appointing and authorizing the above named persons to act as their Official Representatives.
3. Attach the Certificate by a Notary Public certifying the authenticity of the signature and capacity of the persons(s) issuing the Power of Attorney.

MUMBAI METRO LINE 3
(COLABA-BANDRA-SEEPZ)

CONTRACT NO: MM 3-CBS-DEM

Design, Manufacture, Supply, Installation, Testing and Commissioning of E&M works comprising of Electrical Sub Stations with HT and LT works, Ventilation and Air Conditioning Systems (VAC), Fire Detection Systems, Fire Suppression (Fire Fighting) Systems, Building Management System (BMS), EOT cranes, Air-Compressors including compressed air piping works and Plumbing Pumps for the Depot Buildings including OCC and at grade Aarey Station for "Mumbai Metro Line -3"

VOLUME 3 OF 6

EMPLOYER'S REQUIREMENTS
GENERAL SPECIFICATIONS

APPENDIX-28
LIST OF APPROVED MANUFACTURERS / SUPPLIERS
OR
MAKES AND MATERIAL FOR E&M WORK

AUGUST- 2017

Mumbai Metro Rail Corporation Ltd.
Plot No. R-13, 'E' Block,
Namttri Building
Bandra - Kurla Complex,
Bandra (East), Mumbai – 400051, India

LIST OF APPROVED MANUFACTURERS / SUPPLIERS
OR
MAKES AND MATERIAL FOR E&M WORK AND APPROVAL PROCEDURE

All materials and products used in the Scope of Work shall conform to the Contract Document, Employer Requirement - Technical specifications, relevant codes, relevant standards, etc. and shall be of approved make and design.

There are currently no approved manufacturers and suppliers for the MML-3 Project.

The approval of a manufacturer/vendor shall be given only after review of the sample/specimen by the Engineer. The complete system and installation shall also be in conformity with the "Applicable Codes Standards and Publications

Vendor Approval

(a) It shall be obligatory for the Contractor to obtain Notice of 'No Objection' from the Engineer for the selection of the vendors for all items of work, even if the name of the vendor is specified in the Contractor's Technical Submission and the works to be done including purchase of materials and equipment is in accordance with the Technical Specifications and Standards specified in the Contract.

(b) The contractor shall ensure the correct selection of the make meeting the specifications and its application. Before placing the order for procurement, the sample of approved make shall be verified for its suitability to the specification and application. In case Engineer, (whose decision will be final and binding on both parties) considers that the make/ model proposed by the contractor does not meet the tender requirement, the contractor will be required to propose an alternative make acceptable to the Engineer.

(c) The contractor will submit a list of vendors for all the items of the BOQ contract

(d) Vendor to be selected who are capable to provide good after sales services available in Mumbai during DLP and thereafter.

Vendor Approval and Selection Procedure

(a) In the event of contractor wanting to use alternate makes other than those stipulated, for any reason, the contractor can send a proposal after ensuring that what he proposes at least meets the specifications both, the quality and safety standard of the stipulated makes, the alternate proposed product should be a proven one. He shall also stand full guarantee to his alternate proposal and if at any stage it is found that the material is not suitable or meeting the tender requirement, the contractor shall replace the material and provide the material from the approved vendor without any additional cost to MMRC.

The alternate makes can be used only after an approval accorded by the Employer, whose decision will be final in the matter.

(b) The approval of any equipment or product to be used shall be done in two stages:-

i. Stage-I

- Assessment of capability of proposed Vendor to supply a particular equipment or product, with quality and performance requirements, as required by Specifications as well as other contract conditions. The proposed product should be a proven product in service for at least 3 years.

- Assessment of the financial and functional strength of the Vendor to supply the requisite quantity of equipment and product as per delivery schedule acceptable to contractor and engineer to deliver the project in time.

ii. Stage-II

Stage-II called as Technical Submission Approval Stage, selection of Equipment or product from the equipment / products manufactured / supplied by the approved vendor will be done. This stage includes thorough technical assessments about the conformance of the offered equipment / product to the Specifications and other requirements.

iii. To obtain **Vendor** Approval the Contractor must apply with the four sets of the following documents to the Engineer

(i) Company Profile and Experience of the Vendor
(ii) Clause wise compliance of the relevant Clauses of Specifications.
(iii) Details of supplies / orders executed in last ten years for the type of equipment / product offered. Supplies / orders executed for Underground Metro Systems shall be specifically mentioned
(iv) Details of the facilities available at the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured.
(v) ISO 9000 Certification for the Works / Manufacturing Unit where the proposed equipment / product shall be manufactured (The Works / Manufacturing Unit where the proposed equipment / product shall be manufactured must have ISO 9000 Certification)
(vi) Proof regarding compliance to Manufacturer's Qualifications. The offered products must be proven in service.
(vii) Audited Financial Statements of the Vendor for the last three years.
(viii) Type test certificates/ Performance certificate from accredited laboratories for the proposed type of equipment / products to establish the technical capability of the vendor (In case, specific requirements are mentioned in the relevant sections of Specifications with regard to type testing, same shall also be complied additionally).
(ix) The vendor shall not have been blacklisted by any Govt. Agency in India.
(x) Any other item as required by Employer / Engineer.

iv. Contractor must certify the check list provided that vendor Proposal is complete and all the above documents are available in the Vendor Proposal. In addition, the Contractor must check / certify compliance to the Specifications before forwarding the same.

v. Incomplete Vendor Proposal will not be treated as a submission and will be returned.

vi. Engineer will give Approval to the Vendor Proposal (received complete with all the documents mentioned above) expeditiously.

vii. Technical submission shall be accompanied with the calculations / other technical documents to justify the selection of any particular model of equipment / product, detailed technical features / parameters of the selected product, type test certificates from the accredited laboratories for the offered products, any other document required by the Engineer.

viii. Engineer will give Approval to the Technical Proposal (received complete with all the documents mentioned above) expeditiously.

(c) It may be noted that Approval of Vendors as per Point (3) above shall only be done by Employer / Engineer after the award of the work. Vendor submissions shall not be evaluated during the tender evaluation. Conditional Tender offers received from Tenderers with particular Vendors for supply of equipment/ products will not be evaluated during evaluation and will be dealt with after award of the work.

(d) It may further be noted that Employer / Engineer shall be under no obligation to accept equipment / products manufactured by the successful Tenderer, unless it meets the entire criterion mentioned above.

(e) Additional Points

In addition to above, the following shall also be ensured for the Vendor Approval and Selection:-

(a) Proven Design

The Contractor shall develop the design based on this specification and on sound proven and reliable engineering practices. The broad design details shall be submitted with technical support data in the technical bid. Detailed calculations shall be submitted to the Engineer during the design process stage for review and approval.

(b) Systems and Sub-Systems

Manufacturer shall have at least 5 years' experience of design and manufacturing of similar system. Proposed systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 3 years in minimum.

All sub-systems, equipments and major components etc. (hereinafter referred as 'sub-systems') shall be state-of-art and of proven design.

Proposed Systems/ sub-systems shall have been in use and have established their satisfactory performance and reliability on at least Two mass rapid transit systems (including Railway or Airports) in revenue service over a period of three years or more either outside the country of origin at an average in two different countries or in MMRC. Systems/ Sub-systems/ components used in MMRC do not get automatically qualified for use unless specifically approved by the Engineer for this project. If required by the Engineer, Contractor shall provide certificate of satisfactory performance for a period of five years or more from the Metro operators. Where similar System/ Sub-systems of a different rating are already proven in service as per the above criteria then the supply shall be based on such sub-systems.

All 'sub systems' shall be procured from the approved vendors and sourced from only such manufacturing units that have supplied the sub-systems that fulfil the proven design requirements as above.

In case the contractor proposes to use systems or sub-system(s) that do not fulfil the above said criteria then the contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered systems and sub-system(s) for review of the Engineer.

The Engineer's decision on contractor's proposal shall be final and binding.

(c) For sourcing the equipment from indigenous manufacturing facilities, following conditions shall be complied:-

(i) In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, no change in design, component

type/make, quality standards, manufacture procedure, etc. shall be made without specific approval of the Engineer.

(ii) In case OEM wants to use manufacturing facilities in India (other than his own) for items for which the OEM has been approved, it shall enter into an agreement with such selected Indian equipment manufacturer and obtain prior approval from MMRC. No change in composition, rating, type, model no., manufacturing process, quality standards, design, etc. and make of the components used in assemblies/sub-assemblies of such equipment as manufactured by the approved parent vendor shall be made without specific approval of the Engineer.

(iii) In case OEM wishes to change/make/type specifications, etc. of any sub-components for supplies to be sourced from Indian facility, specific prior approval of the Engineer shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the contractor.

(d) Format for submitting the vendor approval request shall be given to the contractor during initial stages and approved format shall be followed throughout the contract.

APROVED LIST OF MAKES & MATERIAL FOR E&M WORK

1. All materials and products used in the work shall conform to the relevant standards/specifications and shall be of approved make and design. A list of proposed manufacturers/vendors is given below. The approval of a manufacturer/vendor shall be given only after review of the sample/specimen by the Engineer-in-charge.
2. The Contractor shall quote the rates for material and equipments as per the list of proposed makes. In the event of contractor wanting to use alternate makes other than those stipulated for any reason, the contractor can send a proposal after ensuring that what he proposes at least meets both the quality, and safety standard of the stipulated makes. He shall also stand full guarantee to his alternate proposal.
3. The Contractor shall ensure the correct selection of the proposed make meeting the specifications and application duties. Before placing order for procurement, the sample of proposed make shall be verified for its suitability to the specification and application duty. Employer's representative / engineer, whose decision will be final and binding on both Parties.

MAKES OF MATERIALS / PRODUCTS ELECTRICAL WORKS		
SL NO.	**Details of Materials / Equipment**	**MAKES OF MATERIALS / PRODUCTS**
1.	Transformer	Areva, ABB, Crompton, Siemens,
2	GIS	Siemens, ABB, Crompton, Areva, L&T, Schneider
3	HT Cables	Finolex, Asian/RPG, Polycab, Universal, ,CCI, NICCO, KEI, Terewel

4	HT termination Kit	Raychem, NKT, 3M, Pfisterer, Dension
5	LV Switchboards	Tricolite Electrical industries, L&T, GE, Schneider, Unilec, Neptune, Adlec, Suddhir Genset Ltd, ABB
6	Air Circuit Breaker (ACB's)	L&T, Siemens, ABB, Schneider, GE,
7	Moulded Case Circuit Breaker (MCCB)	L&T, Siemens, ABB, Legrand, GE, Schneider,
8	Distribution Board	L&T, Hager, Legrand, Siemens, ABB, Havells, GE, Tricolite, Schneider, Neptune, Adlec, Sudhir Genset Ltd.
9	ELCB/RCCB	L&T, Hager, Legrand, Siemens, Schneider, ABB, HPL, Indoasian, Havells
10	Miniature Circuit Breaker (MCB)	L&T Hager, Legrand, Siemens, Schneider, ABB,GE, HPL, Indoasian, Havells
11	Switch Fuse Units with HRC Fuses	L&T, GE, Siemens, Control & Switchgear ltd, ABB, Crompton –Greaves, HPL, Indoasian, Havells, Schneider, Cuttler Hammer
12	Protective relays	Alstom (AREVA), ABB, L&T, Siemens, Schneider,GE
13	Capacitors	Crompton, Mehar (Schneider), L&T, Siemens, Ducati, ABB, Asian, Khatau junkar, ABB, Universal,
14	Current Transformer (Epoxy Cast Resin)	AE, Kappa, Control & Switchgear, Precise, G&M (Gilbert & Maxwell),Matrix, Conzerv, Ricco, Pragati, Megawin
15	Electronic Digital Meters (A/V/PF/Hz/KW/KWH) with LED Display	MECO, DUCATI, Allen Bradely, Motwane, AE, Enercon, HPL, Schneider, L&T Secure, Rishab, IMP,
16	Selector Switch, Toggle switch	Kaycee, L&T (Salzer), BCH, Teknic, Schneider, ABB, Siemens, HPL.
17	Indicating Lamps LED type, Push Button	L&T, BCH, Vaishno, Siemens, Teknic, RAAS, Schneider.
18	APFC Relay	Enercon, L&T, Ducati, Epcos, GEC, Emerson, Alstom
19	Control fuse with Base	Siemens, GE, C&S
20	MPCB	L&T, ABB, Siemens, GE, C&S, Schneider
21	Contactors	L&T, ABB, Siemens, Group Schneider, Cuttler Hammer, HPL, Havells
22	Programmable Timer (Self powered Electric digital)	L&T, Siemens, Legrand
23	Motor Starters	L&T, ABB, Siemens, C&S, Cuttler Hammer, HPL, Havells
24	Digital Energy Meter	AE, Rishab, C&S, Tecnic, Siemens, Schneider, L&T, Indoasain.
MV CABLING		

1	XLPE aluminium/copper conductor Armoured MV Cables (FRLS)	Finolex, Asian/RPG, Havells, Cords cable, Scot innovation, Bonton, Polycab,Skystone, Universal, Gemscab, Grandlay, Ralison, Glostar, CCI, NICCO, KEI, Terewel
2	Copper / Aluminium (Crimping type) Cable lugs for 1100 volt grade cables	Dowell's, Jainson, Gripwell
3	Compression glands for 1100 volt grade cables	Peeco, Comet, Commex, Gripwell, Dowels, Braco, Jainco.
4	Copper conductor FR PVC insulated wires ISI marked.	KEI, Finolex, Havells, Bonton
5	Copper control cable	Finolex, Skystone, Polycab, Rajnigandha, Batra, Proflex, National.
6	PVC Insulated copper multi – stand wires 1.1kV grade (FRLS)	Finolex, Skystone, Polycab, Rajnigandha, Batra, Proflex, National, KEI, Gloster, Kundancab, Anchor, Rallison, Indoasian, Havells, HPL, Terecom
7	Terminal Blocks & Cage clamps	ELMEXX, PHOENIX, WAGO, CONNECTWEL, or equivalent.
8	Cable Trays / Raceways	Bharti, Unitech, Steelways, MEM, Slotco, Indiana, Rico, Profab, Globe, Sadhana, Legrand, Venus, shah electro fab and equivalent.
9	GI Strip & Earthing Materials	Slotco, Indiana
CONDUIT WIRING & ASSOCIATED ACCESSORIES		
1	GI Conduit ISI Marked	BEC, AKG, Steel Kraft, and other equivalent ISI marked
2	GI Conduit accessories	Conforming to BIS/IS as per approved samples
3	Modular system, switches, socket outlets and wiring accessories with moulded cover plates	Crabtree, MK Electric, Legrand, Schneider, SSK, ABB, Clipsal, Anchor(Wood/Roma), Indoasian,
4	Industrial Sockets	Clipsal, Legrand, Crompton, Cuttler Hammer
5	Outdoor Boxes	Clipsal, Henzel, Hunter, Sintex, National
LIGHTING & FANS		
1	Light Fittings	Philips, Bajaj, Instapower (for LED fitting only), Crompton, Wipro, GE, Havells, C&S
2	Ceiling Fan	Crompton greaves, Orient, Khaitan, Alstom, Bajaj, Anchor, Usha
3	Fan Regulator	Clipsal, Anchor(wood/Roma), Legrand(Mosaic), MK(Wraproud),Crabtree, Indoasian
4	Lamps	Philips, Osram
5	Lighting Poles	Paruthi, Bajaj
6	LED Chips	Philips, Nitchia, cree, seoul semiconductors
7	Area Lighting Mast	Philips, Bajaj, Crompton, GE, METAL COATS (KLITE)
UNINTERRUPTED POWER SUPPLY (UPS) & INVERTER		

1	UPS System	Emerson, Numeric, APC, Piller, Schneider, GE, Aros-PCI, Dubas, DB Power ware, Aplab, , APC
2	UPS Battery	Exide, Furukawa, Standard, Panasonic, Amara raja, HBL-Nife, Amaron or equivalent
3	Inverter	Luminous, Micro Tek, Su-Kam
4	Battery and Battery Charger	RDSO Approved Vendor
COMPACT SANDWITCH TYPE BUS DUCT & LV LIGHT BUS TRUNKING		
1	Busduct	EAE, Henikwon, Schneider, Siemens, L&T, C&S
2	Light Bus Trunking	Legrand, MK.
DG SETS		
1	Diesel Engine	Cummins, Perkins, Caterpillar,KOEL,Greaves cotton.
2.	Alternator	Stamford, Leroy–somer, Jyoti, Crompton Greaves,KEC
3	PLC Make	Woodward, Power-R-Con, DIEF, Schneider, Allen Bradley, Siemens.
4	AMF Panels	Tricolite Electrical industries, ECS, L&T, GE, Associated switchgear, Schneider, Unilec, Neptune, Anand Power, Adlec, ABB, Sudhir Genset Ltd.,
5	Silencers	Neilson or any other equivalent confirming the CPCB norms.
FIRE ALARAM & DETECTION SYSTEM		
1	FACP	Notifire, Simplex (Tyco), Edward
2	Smoke & Heat Detectors	Edward, Appolo, Cerberus, Tyco, Notifier, System Sensor,.
FIRE HYDRENT & FIRE FIGHTING SYSTEM		
1	Pumps	Kirloskar, Mather & Platt,Grundfos, EBARA
2	Motors	Kirloskar. ABB, Siemens, NGEF, GEC,Alshthom, Jyoti, Crompton greaves
3	Starter Switches and Switch units	As per LV Switch board including DB list
4	Pressure Switch	Indfoss, Switzer, Morley, System Sensor, Donfoss
5	Pressure Gauge	H Guru, Fiebig, Newage, Sukan, wika
6	Pipes (MS & GI)	TATA, Jindal, hissar, Prakash surya(Delhi), Rama Steel(UP)
7	MS/GI forged steel fittings	Vs, Suru, B&M,Unik,DRP-M,IVC, Equivalent
8	MS/GI butt welded ERW fittings	Deccan metal, Unik,DRP-M,IVC / equivalent
9	Sluice valve	Kirloskar, leader
10	Gunmetal stainless steel valves (full way & check valves)	
11	Class- i	Zoloto, leader
a.	Class –ii	Leader, Sant
b.	Non-return valves	Kirloskar, leader, Advance, Castle
c.	Butterfly valve	Audco, Advance, Castle
d.	Hydrant valve	Newage, Minimax, Omex

e.	Hose reel tube (Thermoplastic Synthetic reinforced)	KESARA PLAST, SYNTEX
12	Hose pipe (RRL Type)	Jaayshree, Newage, CRC, Jyoti,Maruti Dunlop, Minimax, Safex, Zenith, Omex
13	Branch pipe with nozzle	Newage, Safeguard, Minimax
14	Hose Box	Superex, Omex,, Newage or Reputed make as per IS specification subject to MMRC approval
15	Paints exposed pipes	Asian paints, Berger, Shalimar
16	Anchor Fasteners	Hilti, hi-tech supports, Fischer
17	Wrapping & coating materials for underground pipes	IWL (pypkote), Corpotape, equivalent.
18	Primer paints for painting for above ground pipes	Shalimar bitumanstic paints and equivalent
19	Y-type suction strainer	Kirloskar, leader
20	Foot valve with strainer	Kirloskar, leader, Zoloto, Sarkar
21	Sprinklers	Tyco, spray safe(UK), reliable(USA), grinnel, Star
22	Alarm Valve (installation Valve)	HD fire, Mather & platt, spraysafe, central
23	Water motor gong & trims	HD fire, Mather & platt, spraysafe, central
24	Flow switches	Switzer, forbes, marshell, Viking, gem, macdonald,grinnel,system sensors, morlay, ias
25	Air release valve	Newage, Kirloskar
26	Ball valve	TBS, IBP, equivalent
27	Cast iron non-return valve double flanged	Kirloskar, leader, kalpana
28	Rubber gasket	Reputed make as per is specification subject to MMRC approval
29	CO2 gas fire trace tube system	Fire trace, Tyco / Equivalent
30	Portable fire extinguisher	Minimax, safex, Zenith, safeguard, Omex, Nitin
31	Welding Electrode	Advani oerlikon, L&T
32	Vibration Eliminator pads /Flexible pipe connections	Resistoflex
33	Four ways and two ways collecting head	Minimax, Omex, Newage
34	Pressure Switch	Danfos
35	Sprinkler head , Alarm Valve	HD fire protect TYCO- Spraysafe
AIR-CONDITIONING AND VENTILATION SYSTEM (DEPOT & AAREY STATION)		
1	Circulator fans / Exhaust fans/ Inline Fans	Crompton Greaves, Orient, Khaitan, Alstom, Almonard, Humidin, Kruger, Comfrie, Osteburg,
2	Air Conditioning system	Carrier, Blue Star, LG, Daikin, Toshiba, Hitachi
3	VRV/ VRF	Daikin, Mitsubishi, Your, Hitachi, LG, ETA Gree, O general, Trane, Toshiba, Voltas, Bluestar
4	Heat Recovery Unit	Bry-Air, Zeco – Aircon, DRI
AIR-CONDITIONING AND VENTILATION SYSTEM FOR OCC		
1	AHU	Waves Aircon, Systemair India, ETA, Blue Star, Voltas
2	Centrifugal fan (AHU)	Kruger
3	Air Filters	Spectrum, Airtech, Dynacraft, Pyramid

4	FCU	Waves Aircon, ETA, Blue Star
5	Air Cooled Chiller	Train, Dunhambush, York, Voltas, Bluestar
6	Pump Set	Kirloskar, ITT
7	GI Sheet	Tata, Jindal, Nippon, SAIL, Bhushan steel
8	Prefabricated Duct	Rolastar, Zeco, Techno fabriduct,
9	Motorised Fire Dampers	Ruskin India, Greenheck India, Air track control, Conaire, Georage Rao, Ravistar.
10	Manual Damper	Systemair India
11	Volume control Damper	Systemair India, Air track control,,HPS, Caryaire
12	Grills	Systemair India, Caryaire, Air track control, Conaire
13	Diffuser	Systemair India, Caryaire, Air track control, Conaire
14	Fire Rated Paint	Firespray International Ltd.
15	Insulation (Non fire rated)	UP Twiga
16	Insulation (fire rated)	Rockwool india pvt. Ltd., Lloyd Insulation Ltd.
17	MS & GI pipes	Jindal, Tata
18	Balancing Valve	Advance India, Kitz, Dersess
19	Check Valve	Advance India, Kitz
20	Butterfly Valve (Non-Motorised)	Advance India, Kitz
21	Butterfly Valve (Motorised)	Belimo, Kitz
22	PICV- AHU	Flowcon
23	PICV- FCU	Flowcon, Pettiranaroli
24	Y- Strainer	Emerald, Sant
25	Axial Flow Fans	Kruger, Systemair
26	Propeller Fan	Kruger, Systemair
27	Flexible Coupling	Resistoflex
28	Motor	ABB, Crompton, Simens, Alstom
29	Automatic Expansion Tank	Anergy, CIMM, TACO
30	Air Vent	Anergy, Flamco
31	Temperature Gauge	Waree
32	Pressure Gauge	Waree
33	VFD	ABB, Danfoss
34	Silencers	Nelson or any other equivalent confirming the CPCB Norms.
35	Acoustic Lining (Fiber glass)	Beardsell, UP Twiga, Owens corning, Lioyd, Kimco
36	Closed Cell (polyethylene insulation)	Torcellen, Armacell, Supreme
37	Vibration isolator	Flexionics (USA), Kanwall, Resistoflex
38	Air Washer	Zeco, Edgetech, Trion, Brightflow, Conaire
39	Scrubber	Conaire, Edgetech, Trion, Brightflow
EOT CRANE & AIR COMPRESSED SYSTEM		
1	EOT Cranes	M/s. Demag Cranes & Components (India) Pvt. Ltd., M/s. Saico Engineers & Fabricators, M/s. Furnace & Foundry Co., M/s, Mukund Ltd.

2	Air Compressor	Atlas Copco, Ingersoll Rand, M/s. Elgi compressor, M/s. Kirlosker copland
BMS-PLC & SYSTEM INTEGRATOR		
1	Master Control Equipment's (PLC)	GE-FANUC, Schneider, Rockwell
2	Air Flow Differential Pressure Switches	Honeywell, Siemens
3	Duct Temperature Sensor	Greystone
4	Two way and three way motorised valve with actuators	Honeywell, Siemens
5	Differential transducer	Honeywell
6	Flow Meter	JN Marshall
7	Space—Sensor	OEM, Greystone
8	Pressure Transducer	Greystone
9	Dot Matrix Printer	EPSON
10	Second Printer	Laser Jet
11	Liquids Level Switch	Techtrol, Level Tech
12	Server PC	DELL
13	Monitor	DELL
14	Notebook PC	DELL

2.1. BUSDUCT (SANDWICH TYPE)

2.6.1 GENERAL

This section covers technical specifications of Compact Sandwich Type copper conductor bus duct suitable for outdoor/Indoor installations.

2.6.2 STANDARDS

Updated and current Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the following standards as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

STANDARDS	DESCRIPTION
IS 8623 (Part-1) 1993	Low voltage switchgear and controller assemblies: Part-1 Requirement for type tested and partially type tested assemblies
IS 8623 (Part-2) 1993	Low voltage switchgear and controller assemblies: Part-2 Particular requirement for busbar trunking system (bus ways)
IS 8623 (Part-3) 1993	Low voltage switchgear and controller assemblies: Part-3 Particular requirement for equipment where unskilled persons have access for their use
IEC 61439- 1&6	Bus trunking systems
Indian Electricity Act 2003	
Indian Electricity Rules 1956	
National Building Code 1994	
National Electric Code 1985	
Code of Practice for Fire Safety of Building (general)	
IS 1641	General Principal and Fire Grading

2.6.3 ENCLOSURE

The enclosures of Bus Ducts shall be totally enclosed non ventilated type. The enclosures shall be fabricated from galvanized sheets of minimum 14 SWG or aluminium of 2.5mm thickness. The enclosures shall be epoxy polyester painted RAL7032 after regress metal treatment process

Enclosures shall be provided with M6 screws applied at every 10 cm along the entire length. Ingress protection for the enclosures shall be IP55. Enclosure shall be rendered dust proof and vermin proof by adequate gasketing etc. to provide ingress protection of not less than IP-55 as per IS .The Bus Trunking System shall be manufactured in convenient section to facilitate easy transportation and installation.

The sections shall be connectable to form vertical or horizontal runs as required. Each section shall be provided with suitable support arrangement from walls / ceilings as required.

Expansion joints may be provided as per manufacturer's design and recommendation. Bus trunking system shall be provided with two independent earthing Cu conductors of 25% of current rating on both through the length of the system. Effectively connected to the enclosure by riveting/ bolting End covers shall be provided as required.

2.6.4 SYSTEM PARAMETERS OF BUS DUCTS

Bus Ducts shall be suitable for following system parameters.

Type	Compact Sandwich type bus duct with insulated bus Conductors
Supply system	3 phase, 4 wire, AC 415, Volts 50 Hz
Rated Insulation Voltage (Volts)	1000
Number of Conductors	3 Phase 4/5
Power Frequency Withstand	2500 Volts
Current Rating	3200 Amps 3P + 100% N + 50% Integral. External body Earth including bends and earth strip of 25% of current rating on both side.)
Temperature Rise	50ºC above 45º C ambient. Design data in support of temperature rise being within permissible limits shall be furnished along with the tender.
Short circuit ratings	Minimum short circuit ratings 65 KA for 1 sec.

The busbar Systems offered shall be complete with all necessary accessories like elbows, off sets, reducers etc.

2.6.5 BUSBARS

Busbar shall be fabricated 99.9% pure ETP grade copper as applicable. Rating of busbar shall be as specified in drawings /Schedule of quantities. Rating of the busbares shall be as per Schedule of Quantities. Each busbar shall be jointed to the adjacent section by single bolt-joint clamps without drilling the busbar. Joint between two sections shall be such that complete sub assembly is removable so that isolation of individual sections is possible without disturbing only sections. The Joints shall be of one bolt type which utilizes a high strength steel bolt and washers to maintain proper pressure over a large contact surface area. The bolt shall be torque indicating and at earth potential, it shall be two headed design to indicate when proper torque has been applied and require only a standard long handle wrench to be properly activated. Access shall be required to only one side of the busbar trunking for tightening joint bolts. Flexible connections shall be provided by multi leafed conductors for termination.

Removable bolted disconnect links shall be provided in the bus wherever required for the purpose of isolation if required.

All matching flanges, fittings, supports etc as may be required for terminating the bus ducts/rising mains at the switchgear and/or transformer end shall be included.

Busbar conductors shall be insulated with 2 layers of extruded polypropylene sleeves and 3 layers of Mylar (Polyester film) between conductors. Electric connection shall be made at joints by single bolt joint construction and each joint shall have 2 "Belleville" washers. The joints shall be manufactured of glass reinforced polyester. Joints shall be realized by a torque spanner (wrench) set at 80 Nm. To prevent the joints to be damaged during transport, they shall be protected by plastic caps, which shall be removed before installation. To prevent the joints bolt from loosening there shall be locker pieces on both sides of the bolt.

Current density shall not be more than 1 amp per sq.mm Each busbar shall be individually insulated by means of 4 layers of glass mica and polyester insulation to give minimum class F (bus temperature 155 Deg C) insulation.

Each busbar shall be jointed to the adjacent section by single bolt-joint clamps without drilling the busbar. Joint between two sections shall be such that a complete sub assembly is removable so that isolation of individual sections is possible without disturbing other sections. Inspection windows shall be provided over the joints to check tightness.
Flexible connections shall be provided by braded or multi leafed conductors for termination.

2.6.6 BUSBARS

Bus trunking system shall be complete with all accessories like bends, busduct, expansion joints, flexible connections etc to suit site requirements. Bus trunking systems shall be complete in all respects whether any item is individually listed in Schedule of Quantities or not. All accessories shall be deemed to be included in the unit rate of straight length of the busduct.

2.6.7 TYPE TEST CERTIFICATE

Bus Duct configurations offered shall be CPRI /Independent test house tested. Copies of the test certificates for same rating & identical switchgear shall be submitted by successful Tenderers at the time obtaining of Vender approval. This shall not be more than 5 years old.

2.6.8 TESTING AT MANUFACTURER'S WORKS

The Bus ducts shall be tested in accordance with IEC 61439-6 and the related test certificate shall be from an independent international test laboratory.

2.6.9 TESTING AT SITE

- Physical check including checking damage / crack in any components, tightness of the bolts and connections etc.
- Insulation test after installation according to manufacturer's test procedures.
- All routine tests as per relevant IEC 61439 shall be conducted on the bus bar.
- Insulation resistance: The testing shall be done as per IS: 8084- 1976
- Earth `Continuity test.