CORRIGENDUM No. 5
Tender No. CMRL-P1-PMC-01-2025
"Selection of Project Management Company (PMC) for Chennai Metro Rail Phase 1 Network Capacity Enhancement Project"

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
1	Section-1 to 6	ALL	NIT clause 1.2 (1) ITC, Data sheet, 2.2 Technical bid, FORM -12A Technical bid, FORM -12B Technical bid, FORM -12C Technical bid, FORM -13 TOR, Chapter-2	Selection of Project Management Company (PMC) for Project Management Consultancy Services (PMCS) and Detailed Design Consultant (DDC) for Chennai Metro Rail Phase 1 Network Capacity Enhancement Project	Selection of Project Management Company (PMC) for Chennai Metro Rail Phase 1 Network Capacity Enhancement Project
2	Section - 2	Instructions to Consultants (ITC)	1(k)	“Joint Venture (JV)” means an association with or without a legal personality distinct from that of its members, of more than one Consultant where one member has the authority to conduct all business for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.	“Joint Venture” or “JV” or "Consortium" means any combination of two or more firms in the form of a joint venture, consortium, association or other unincorporated grouping under an existing agreement or with the intention to enter into such an agreement supported by a formal Letter of Intent.
3	Section - 2	Instructions to Consultants (ITC)	ITC 20 (1.1)	**Past experience of the Consultant :-** No. of years of experience as Consultant (single entity or JV member) in Similar Projects (Single or Multiple Projects) pertaining to Metro Rail in India or International,. a) 15 marks for seven or more years of experience b) 10 marks for more than 5 but less than 7 years of experience. c) 5 marks for more than 3 but less than 5 years of experience. c) Zero marks for less than 3 years of experience.	**Past experience of the Consultant :-** No. of years of experience as Consultant (single entity or JV member) in Similar Projects (Single or Multiple Projects) pertaining to Metro Rail in India or International,. a)15 marks for ≥7 years of experience b)10 marks for ≥ 5, but < 7 years of experience. c) 5 marks for ≥ 3, but ,< 5 years of experience. d) Zero marks for < 3 years of experience.
4	Section - 2	Instructions to Consultants (ITC)	Clause-20 Past experience of the Consultant: (1.1) column 5 Additional Information	i) In case of the Bidder is a JV/Consortium, Lead member experience will only be considered. ii) Years of experience will be calculated for the period of last 10 years as on the last date of bid submission. iii) Copies of LoA/Agreement/Work order and Proof of completion of work issued by respective client and proof of experience shall be submitted by the bidder. iv) The period between Date of issue of LoA/Agreement/Work Order and Date of work completion shall be considered as experience period.	i) In the case of the Bidder is a JV/Consortium, only the Lead Member’s experience shall be considered for evaluation ii) Experience of the bidder will be calculated from the project(s) that is executed by the them during the period of last 10 years only as on the last date of this bid submission. iii) Copies of LoA/Agreement /Work order/ certificate issued by the client (clearly mentioning the scope of work, project value, start and completion dates) shall be submitted the bidder. iv) Proof of completion of work for the completed project(s) and proof of experience for ongoing project(s), issued by the respective client shall be submitted by the bidder. v) The period between Date of issue of LoA/Agreement/Work Order and Date of work completion shall be considered as experience period. However, Only the portion of project executed during the last 10 years period as on the last date of this bid submission shall be considered for experience of the bidder.

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
5	Section - 2	Instructions to Consultants (ITC)	ITC 20 (1.2)	**Past experience of the Consultant :-** No. of similar projects (ongoing or completed), where the fees received per project is above INR 35 crores for the period of last 10 years as on the last date of bid submission, in India or Internationally. a) 25 marks for three or more projects b) 16 marks for two projects c) 8 marks for one project d) Zero marks for nil projects	**Past experience of the Consultant :-** No. of similar projects (ongoing or completed), where the fees received per project shall be as detailed below for the period of last 10 years as on the last date of bid submission, in India or Internationally. a) 25 marks for :- 3 or more projects for which, the fees received per project is ≥ INR 35 crores and ≤ INR 70 crores, OR 2 projects for which, the fees received per project is > INR 70 crores, b) 16 marks for two projects for which, the fees received per project is ≥ INR 35 crores c) 8 marks for one project for which, the fees received is ≥ INR 35 crores d) Zero marks for nil projects
6	Section - 2	Instructions to Consultants (ITC)	ITC 20 (2.1)	**Substantial completion of similar projects :-** Substantially completed similar projects in terms of total route km commissioned (in revenue operation) in last 10 years as on the last date of bid submission, in India or Internationally. a) 35 marks for more than 50 route km b) 50 marks for >= 30, but < 50 route km c) 20 marks for >= 10, but <30 route km d) Zero marks for < 10 route km	**Substantial completion of similar projects :-** Substantially completed similar projects in terms of total route km commissioned (in revenue operation) in last 10 years as on the last date of bid submission, in India or Internationally. a) 35 marks for >= 50 route km b) 30 marks for >= 30, but < 50 route km c) 20 marks for >= 10, but <30 route km d) Zero marks for < 10 route km
7	Section - 2	Instructions to Consultants (ITC)	Clause-20 Past experience of the Consultant: (2.1) column 5 Additional Information	ii) For contracts under which the Bidder participated as a JV member, only the Bidder's share, by value, shall be considered to meet this requirement	ii) For contracts under which the Bidder participated as a JV member, only the Bidder's share by percentage for total route KM completed/substantially completed shall be considered to meet this requirement.
8	Section -2	Instructions to Consultants (ITC)	Clause 20 Additional criteria/notes:2	Similar Project - General Consultancy or Project Management Consultancy work pertaining to medium metro system (system designed to cater PHPDT above 20,000) or large metro system (system designed to cater PHPDT above 45,000) involving the work of basic designs for systems and review of detailed designs, preparation of specifications, preparation of bid documents and tender assistance, checking designs, project management and supervision including construction supervision, safety, environment management and quality, testing and commissioning of the work.	Similar Project means providing General Consultancy or Project Management Consultancy services to Indian metro railway or International metro railway company. The scope of work must have included atleast majority of the following key components: Review of detailed designs, Preparation of specifications, Preparation of bid documents and Tender assistance, Checking designs, Project management and Supervision including Construction supervision, Safety, Environment management and Quality, Testing and Commissioning of the work.
9	Section - 2	Instructions to Consultants (ITC)	Clause 20 Additional criteria/notes:3	3. In case of JV/Consortium, the members shall identify the Lead Member who shall have the highest share with not less than 40% and Lead member must have done at least one similar work of INR 35 Cr. or equivalent in any currency in last 10 years ending last date of bid submission.	(a) In case of JV/Consortium, the members shall identify the Lead Member who shall have the highest share with not less than 40% and Lead member must have done at least one similar work of INR 35 Cr. or equivalent in any currency in last 10 years ending last date of bid submission. (b) In case of JV/Consortium, other members shall have done at least one similar work in the last 10 years ending last date of bid submission.

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
10	Section - 2	Instructions to Consultants (ITC)	Clause 20 Additional criteria/notes:4	For the purpose of evaluation, the amount received in other currency shall be converted into INR as on 28 days before the last date of this bid submission, as per Foreign Exchange Rate as published by FBIL (Financial Benchmarks India Pvt. Ltd.), irrespective of the date of receipt of payment from the Employer.	(a) For the purpose of evaluation, amounts received in Indian Rupees shall be updated to the current price level by applying annual compounding at 5% inflation for each year. (b) For the purpose of evaluation, the amount received in other currency shall be converted into INR as on 28 days before the last date of this bid submission, as per Foreign Exchange Rate as published by FBIL (Financial Benchmarks India Pvt. Ltd.), irrespective of the date of receipt of payment from the Employer.
11	Section - 2	Instructions to Consultants (ITC)	Clause 20 Additional criteria/notes:5	Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority (As per TN GO Ms. No. 343, dated 18th September 2020)	Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority (As per TN GO Ms. No. 343, dated 18th September 2020), attched as annexure- 03 to the tender document.
12	Section - 2	Instructions to Consultants (ITC)	Clause-20, Additional criteria, Sl. No. 9 *(Newly added)*		The Bidder shall demonstrate access to liquid assets or other financial resources (excluding any contractual advance payment) sufficient to meet the cash flow requirement of INR 2.5 Crores for this Contract, net of the Bidder's other commitments.
13	Section - 2	Instructions to Consultants (ITC)	Data Sheet (2.1)	Method of Selection: Quality and Cost Based Selection (QCBS) – 70:30	Method of Selection: Quality and Cost Based Selection (QCBS) – 80:20
14	Section - 2	Instructions to Consultants (ITC)	Data Sheet (24)	The weights given to the Technical (T) and Financial (P) Bids are: T = *70% and* P = *30%*	The weights given to the Technical (T) and Financial (P) Bids are: T = 80% and P = 20%
15	Section - 3	Technical Bid	FORM TECH-2 clause B (1)	List only previous similar assignments successfully completed in the last 10 years.	List only previous similar assignments successfully completed (fully or substantially), in the last 10 years.

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
16	Section-3	Technical Bid	FORM TECH-4 NOTE: 2	Attach copies of the audited balance sheets, including all related notes, income statements for the last five audited financial years, as indicated above. The financial statements shall be certified by Chartered Accountant under his signature & stamp.	Attach copies of the audited balance sheets, including all related notes, income statements for the last five audited financial years, as indicated above. The financial statements shall be certified by Chartered Accountant under his signature & stamp. For FY 2024-25, provisional statement with CA certification shall be accepted. However, audited statement shall be submitted before signing the contract agreement.
17	Section-3	Technical Bid	FORM TECH-4 NOTE: 4 (*Newly added*)		4. Requirement of Sl. No. 7- Net Worth in FINANCIAL STANDING is not applicable (NA) for the bidder participating as a single entity or as a member of JV/Consortium which is a wholly owned entity (Corporation / Statutory Body / Authority) of the respective National Government. The company shall submit its Ownership details which shall be substantiated by the bidder with supporting documents from the respective government".
18	Section-3	Technical Bid	FORM TECH-5: Column 3	Value of balance work yet to be done (as on this bid submission Date)	Value of balance work yet to be done (as on 31 March 2025)
19	Section-3	Technical Bid	FORM TECH-6 NOTE *(Newly Added)*		NOTE :- Submission of Form Tech-6 is Not Applicable if the Bidder demonstrates access to liquid assets or other financial resources (excluding any contractual advance payment) sufficient to meet the cash flow requirement of INR 2.5 Crores for this Contract, net of the Bidder's other commitments.
20	Section-3	Technical Bid	FORM TECH-8 (1.1) Notes on Evaluation	a) 15 marks for seven or more years of experience b) 10 marks for more than 5 but less than 7 years of experience. c) 5 marks for more than 3 but less than 5 years of experience. c) Zero marks for less than 3 years of experience.	a)15 marks for ≥ 7 years of experience b)10 marks for ≥ 5, but < 7 years of experience. c) 5 marks for ≥ 3, but ,< 5 years of experience. d) Zero marks for < 3 years of experience.
21	Section-3	Technical Bid	FORM TECH-8 (1.1) Document proof submitted	Copies of LoA/Agreement /Work order and Proof of completion of work issued by respective client and proof of experience shall be submitted by the bidder.	(i) Copies of LoA/Agreement /Work order/ certificate issued by the client (clearly mentioning the scope of work, project value, start and completion dates) shall be submitted the bidder. (ii) Proof of completion of work for the completed project(s) and proof of experience for ongoing project(s), issued by the respective client shall be submitted by the bidder.
22	Section-3	Technical Bid	FORM TECH-8 (1.2) Notes on Evaluation	a) 25 marks for three or more projects b) 16 marks for two projects c) 8 marks for one project d) Zero marks for nil projects	a) 25 marks for :- 3 or more projects for which, the fees received per project is ≥ INR 35 crores and ≤ INR 70 crores, OR 2 projects for which, the fees received per project is > INR 70 crores, b) 16 marks for two projects for which, the fees received per project is ≥ INR 35 crores c) 8 marks for one project for which, the fees received is ≥ INR 35 crores d) Zero marks for nil projects

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23	Section-3	Technical Bid	FORM TECH-8 (2) Notes on Evaluation	a) 35 marks for more than 50 route km b) 50 marks for >= 30, but < 50 route km c) 20 marks for >= 10, but <30 route km d) Zero marks for < 10 route km	a) 35 marks for ≥ 50 route km b) 30 marks for ≥ 30, but < 50 route km c) 20 marks for ≥ 10, but <30 route km d) Zero marks for < 10 route km
24	Section - 3	Technical Bid	FORM TECH-12C NOW IT IS HEREBY AGREED AS FOLLOWS clause 3	3. Covenants: The Parties hereby undertake that in the event the Consortium is declared the selected Bidder and awarded the Contract, it shall incorporate a special purpose vehicle (the “SPV”) under the Indian Companies Act, 1956 for entering into a Contract Agreement with CMRL and for performing all its obligations as the Consultant in terms of the Contract Agreement for rendering the desired services desired under the Contract.	3. DELETED
25	Section - 3	Technical Bid	FORM TECH-12C NOW IT IS HEREBY AGREED AS FOLLOWS clause 6	6. Shareholding in the SPV:	6. DELETED
26	Section - 3	Technical Bid	FORM TECH-13 INITIAL FILTER CRITERIA : NOTE	Note: ‘Yes’ answer to any of the above 1 to 8 points shall disqualify the Bidder. The Bidder should also enclose the following undertaking on Rs.100/- Non-Judicial stamp Paper duly notarized as per the format given below along with the Technical Bid.	Note :- (a) ‘Yes’ answer to any of the above 1 to 8 points shall disqualify the Bidder. The Bidder should also enclose the following undertaking on Rs.100/- Non-Judicial stamp Paper duly notarized as per the format given below along with the Technical Bid. (b) Requirement of SL. No. 8 of INITIAL FILTER CRITERIA is not applicable (NA) for the Bidder participating as a single entity or as a member of JV/Consortium which is a wholly owned entity (Corporation / Statutory Body / Authority) of the respective National Government. The company shall submit its Ownership details which shall be substantiated by the bidder with supporting documents from the respective government”.
27	Section - 3	Technical Bid	FORM TECH-14 Note *(newly added)*	--	1. Completed works means either fully completed or substantially completed and paid. 2. For substantially completd projects, the Completion cost shall be filled only up to the period for which the last payment was received as on the last date of bid submission.

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
28	Section - 4	Financial Bid	APPENDIX A -BOQ SPREADSHEET TEMPLATE		APPENDIX A -BOQ SPREADSHEET TEMPLATE, is revised and attached as Annexure-01 to the Corrigendum 4.
29	Section - 4	Financial Bid	FORM FIN-5 APPORTIONMENT OF DDC COST –(SCHEDULE -C)		FORM FIN-5 APPORTIONMENT OF DDC COST, is revised and attached as Annexure-02 to the Corrigendum 4.
30	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-2 Objectives of Consulting Services (A) Objectives of DDC includes:	1. The consultant shall engage suitable experts as Detailed Design Consultant to prepare the Detailed Design Documents according to the DPR and requirements of the Project and to deliver the Scope of services defined in Section 5A.DDC- Scope of Works. 2. Review and updating of Design Documents and As-Built Drawings during the assignment period. 3. Support site co-ordination and interface during the entire assignment period.	The consultant shall engage suitable experts as Detailed Design Consultant to prepare the Detailed Design Documents according to the DPR and requirements of the Project and to deliver the Scope of services defined in Section 5A.DDC- Scope of Works which includes but not limited to 1. Design and preparation of drawings for the Civil, Track and E&M works. 2. Preparation of Bid Documents and Tender Assistance for the Civil, Track and E&M works. 3. Support site co-ordination and interface during the entire assignment period.
31	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-2 Objectives of Consulting Services (A) Objectives of PMCS includes: 1(b)	Review of Deliverables of Detailed Design Consultant (DDC)	Strategic Assessment of Train Control System Modernization

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
32	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-3 Scope of Consulting Services (B) (1) Document and Design Review : (b)	b) Review of Deliverables of Detailed Design Consultant (Design Deliverables of DDC).. PMCS shall seek CMRL's concurrence for any observations on Approved Design Deliverables of DDC documents.	For the existing Siemens LZB700M Automatic Train Control (ATC) system, a comprehensive evaluation of available migration strategies is required to be carried out by the Consultant to ensure continued compliance, safety, and operational efficiency. The principal pathways under consideration are: i. Sustained Operation of Legacy Infrastructure by Continuing with the LZB700M with a suitable train control system for the 28 six car new trains. ii. Migration to Communications-Based Train Control (CBTC) by Current OEM or by any other OEM which will require replacement of both onboard and wayside systems. A detailed cost & time benefit analysis along with implementation strategy and plan for the above options is to be recommended to CMRL.
33	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-3 Scope of Consulting Services (B) (3) Preparation of Bid Documents and Tender Assistance	For Chapter 1- Clause 2, For all Packages Assistance in the Bidding Procedures	For Chapter 1- Clause 2, For all Packages Assistance except Civil, track & MEP in the Bidding Procedures
34	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-3 Scope of Consulting Services (B) (3) Preparation of Bid Documents and Tender Assistance (a)	a) Prepare bidding documents in accordance with the latest version of Standard Bidding Documents together with all relevant specifications, drawings and other documents including the requirements of finding agencies Tender Document(s) prepared by DDC shall be reviewed for further processing .	a) Prepare bidding documents in accordance with the latest version of Standard Bidding Documents together with all relevant specifications, drawings and other documents including the requirements of funding agencies Tender Document(s) prepared by DDC shall be reviewed for further processing .

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
35	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-3 Scope of Consulting Services (B) (3) Preparation of Bid Documents and Tender Assistance (h)	Review of draft tender documents prepared by DDC (For Chapter 1 Clause 2 S.No. 6,7&8)	DELETED
36	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-3 Scope of Consulting Services (B) (4) Construction supervision (j)	For Civil packages - Review and approve the DDC's working drawings, shop drawings and drawings for temporary works. Also review and approve, if any, design prepared by the DDC for any part of the permanent works;	For Civil packages - Review and approve the working drawings, shop drawings and drawings for temporary works to be submitted by the contractor during construction phase
37	Section - 5	Terms of Reference (TOR)	Chapter-3 clause 4.2	4.2 For Chapter 1.Clause 2.For S. No. 12	4.2 For Chapter 1.Clause 2, For S. No. 11

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
38	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-4 Time Schedule Detailed schedule Sl. No. 8	8. Preparation and submission of Construction Reference Drawing (CRD)/Good For Construction (GFC) Drawing along with LDC certificate — 95 Days for Civil. 125 Days for Track and E&M.	8. Preparation and submission of Construction Reference Drawings and Combined Services Drawing for tender purpose along with LDC certificate — ~~95~~ 135 Days for Civil, Tracks 125 Days for ~~Track and~~ E&M.
39	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-4 Time Schedule Detailed schedule Sl. No. 9	9. Review of DDC design and Deliverables for Approval of CRD/GFC Drawings — 115 Days for Civil. 145 Days for Track and E&M.	DELETED
40	Section - 5	Terms of Reference (TOR)	Chapter-5, Chapter-4 Time Schedule Detailed schedule Sl. No. 10	10. Basic design of system Packages (Chapter 1- Clause 2, For all Packages except S.No. 6,7&8.) — 205 Days	10. Basic design of system Packages and preparation and submission of tender document to CMRL (Chapter 1- Clause 2, For all Packages except S.No. 6,7&8.) — ~~205~~ 155 Days

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<tr><th>S. No.</th><th>Part/Section No.</th><th>Section</th><th>Clause No.</th><th>Original Bid Condition</th><th>Revised Bid Condition</th></tr>
<tr><td>41</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Chapter-4 Time Schedule Detailed Note</td><td>Note: No. of Days given above are the Maximum no. of Days from the Date of LoA.</td><td>Note: No. of Days given above are the Maximum no. of Days from the Date of LoA. Delay in completion of the aforementioned works shall attract Liquidated Damages as per the provision available in this tender document.</td></tr>
<tr><td>42</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Table 1
Summary of Expertise required.</td><td>Table 1: Summary of Expertise required.<table><tr><th>S.No</th><th>Category</th><th>Level</th><th>Expert</th><th>Experience required</th><th>Man-Month</th></tr><tr><td>1.</td><td rowspan="2">Pro-A</td><td>Level 1</td><td rowspan="2">Key Experts</td><td>· 15 years or more working experience
· 10 years or more in Relevant Field</td><td rowspan="2">300</td></tr><tr><td>2.</td><td>Level 2</td><td>· 13years or more working experience
· 8 years or more in Relevant Field</td></tr><tr><td>3.</td><td>Level 3</td><td rowspan="3">Non Key Experts</td><td>· 10 years or more working experience
· 5 years or more in Relevant Field</td><td>372</td></tr><tr><td>4.</td><td rowspan="2">Pro-B</td><td>B1</td><td>2 years or more working experience
1 years or more in Relevant Field</td><td>737</td></tr><tr><td>5.</td><td>B2</td><td>2 years or more working experience</td></tr><tr><td colspan="5">Total</td><td>1409</td></tr></table></td><td>Table 1: Summary of Expertise required.<table><tr><th>S.No</th><th>Category</th><th>Level</th><th>Expert</th><th>Experience required</th><th>Man-Month</th></tr><tr><td>1.</td><td rowspan="2">Pro-A</td><td>Level 1</td><td rowspan="2">Key Experts</td><td>For Project Director
· ~~15~~ 20 years or more working experience
· ~~10~~ 15 years or more in Relevant Field
For Deputy Project Director
· 15 years or more working experience
· 10 years or more in Relevant Field</td><td rowspan="2">~~300~~ 396</td></tr><tr><td>2.</td><td>Level 2</td><td>· 13years or more working experience
· 8 years or more in Relevant Field</td></tr><tr><td>3.</td><td>Level 3</td><td rowspan="3">Non Key Experts</td><td>· 10 years or more working experience
· 5 years or more in Relevant Field</td><td>~~372~~ 324</td></tr><tr><td>4.</td><td rowspan="2">Pro-B</td><td>B1</td><td>2 years or more working experience
1 years or more in Relevant Field</td><td>737</td></tr><tr><td>5.</td><td>B2</td><td>2 years or more working experience</td></tr><tr><td colspan="5">Total</td><td>~~1409~~ 1457</td></tr></table></td></tr>
<tr><td>43</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5,Table 1 foot note :
Key Experts Sl. No. 2</td><td>Maximum age criteria for all other Key Experts shall be 60 Years.</td><td>Maximum age criteria for all other Key Experts shall be 65 Years.</td></tr>
<tr><td>44</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Table 1a: Detailed Qualification and experience of Key Experts :- Sl. No. 1</td><td><table><tr><th>No.</th><th>Expert Position & Level</th><th>Minimum qualification</th><th>Minimum Experience</th></tr><tr><td>1)</td><td>Project Director
Pro-A
L1</td><td>Graduate in Electrical / Electronics & Communication /Mechanical Engineering / Equivalent in relevant discipline.. .</td><td>· Must have 15 years of Professional experience in relevant field in any agency
· Must have 10 years of working experience in Rolling Stock System in Metro / Railways / LRT project</td></tr></table></td><td><table><tr><td>1) (a)</td><td>Project Director
Pro-A
L1</td><td>Graduate in Electrical / Electronics & Communication /Mechanical Engineering / Equivalent in relevant discipline.. .</td><td>· Must have 20 years of Professional experience in relevant field in any agency
· Must have 15 years of working experience in Rolling Stock System in Metro / Railways / LRT project. At least one project experience in brownfield metro projects involving capacity enhancement is preferred.</td></tr></table></td></tr>
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S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
45	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1a: Detailed Qualification and experience of Key Experts :- Sl. No. 1(b) *(Newly Added)*		1) (b) | Deputy Project Director Pro-A L1 | Graduate in Electrical / Electronics & Communication /Mechanical Engineering / Equivalent in relevant discipline.. . | · Must have 15 years of Professional experience in relevant field in any agency · Must have 10 years of working experience in Signalling System of GoA2/GoA3/GoA4 in Metro / Railways / LRT project. At least one project experience in brownfield metro projects involving capacity enhancement is essential.
46	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1a: Detailed Qualification and experience of Key Experts :- Sl. No. 1(c) *(Newly Added)*		1 (c) | Senior System Integration Expert Pro-A L2 | Graduate in Electrical / Electronics & Communication Engineering / Equivalent in relevant discipline.. | · Must have 13 years of Professional experience in relevant field in any agency. · Must have 8 years of working experience in Rolling Stock and/or Signalling System in Metro / Railways / LRT project. At least one project experience in brownfield metro projects involving capacity enhancement is preferred.
47	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1a: Detailed Qualification and experience of Key Experts :- Sl. No. 5 Minimum Experience	· Must have 13 years of Professional experience in relevant field in any agency · Must have 8 years of working experience in Metro / LRT project	5) | Senior Civil Expert Pro-A L2 | Graduate in Civil Engineering / / Equivalent in relevant discipline.. | · Must have 13 years of Professional experience in relevant field in any agency · Must have 8 years of working experience in Metro / Railways/ LRT project
48		Terms of Reference (TOR)	Chapter-5, Table 1a: Detailed Qualification and experience of Key Experts :- Sl. No. 8 (Newly Added)		8) | Senior Telecom Expert Pro-A L2 | Graduate in Electrical / Electronics & Communication Engineering / Equivalent in relevant discipline.. | · Must have 13 years of Professional experience in relevant field in any agency. · Must have 8 years of working experience in Metro / Railways / LRT project
49	Section - 5	Terms of Reference (TOR)	Chapter-5,Table 1a foot note : Non- Key Experts Sl. No. 1	Maximum age criteria for all Non-Key Experts shall be 60 Years.	Maximum age criteria for all Non-Key Experts shall be 65 Years.

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
50	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1b: Detailed Qualification and experience of Non-Key Experts, Sl. 5 (Newly Added)		5. Planning Expert, Pro-A, L3 — Graduate in Civil Engineering / Equivalent in relevant discipline — · 10 years or more working experience - 5 years or more in Relevant Field
51	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1b: Detailed Qualification and experience of Non-Key Experts, Sl. 6 (Newly Added)		6. Safety Expert, Pro-A, L3 — Graduate in Civil / Electrical / Electronics & Communication /Mechanical Engineering /Equivalent in relevant discipline — · Must have 10 years of Professional experience in relevant field in any agency - Must have 5 years of working experience in Metro / Railways / LRT project. Person with Operational safety Experience is preferred.
52	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1b: Detailed Qualification and experience of Non-Key Experts, Sl. 7 (Newly Added)		7. Interface Engineer, Pro-B, B2 — Graduate or Diploma in Electrical / Electronics & Communication /Mechanical Engineering / Equivalent in relevant discipline — - Must have 2 years of Professional experience in relevant field in any agency.
53	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 1b: Detailed Qualification and experience of Non-Key Experts, Sl. 8 Minimum Experience	□ Must have 10 years of Professional experience in relevant field in any agency □ Must have 5 years of working experience in Metro / LRT project	□Must have 10 years of Professional experience in relevant field in any agency □Must have 5 years of working experience in Metro / Railways/ LRT project
54	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code	A1 - Project Director (Level 1)	A1(a)- Project Director (Level 1)

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
55	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position code A1(b) *(Newly added)*		1) Report to Project Director. 2) Responsible for overall management, coordination, ensuring compliance with the contract and liaison with senior management of CMRL. 3) Review the previous and on-going related studies and data collected. 4) Identify appropriate design codes and standards in collaboration with the Design Standards for Chennai Metro Rail Project - Phase-I and Chennai Metro Rail Project - Phase-I Extension. 5) Basic Design for Railway systems consists of Signaling, Telecommunications, Traction Power Supply, Sub-stations, Rolling Stock and Maintenance Equipment, OCC, PIS and AFC. 6) Discuss with the Document and Cost Manger, Contract Manager for preparation Bid Documents. 7) Assist the Employer in bid issue, pre-bid conference, response to the bidder's questions, prepare the Addendums if necessary. 8) Conduct bid clarification meeting with the evaluated bidders. 9) Prepare the Bid Evaluation Reports. 10) Draft the Contract Agreements for signing. 11) Review existing Signalling system specification and update Employer's Requirements. 12) Work with other experts concerned with Signalling, PSD and Telecom. 13) Prepare tender documents for contract for Signalling, PSD and Telecom. 14) Study and propose optimized solutions for O&M. 15) Develop planning and strategy for O&M. 16) Estimate O&M cost. 17) Review and approve the documents submitted by the Contractors related to O&M. 18) Coordination between various Contractors and statutory agencies for O&M related activities. 19) Ensure implementation of strategy for O&M during DLP 20) Coordinate all elements of the construction activities. 21) Make suitable arrangement for monitoring the performance of the Contractors and their sub-contractors. 22) Monitor the Contractor's compliance with regard to the insurance, bond obligation as well as the labor and tax laws. 23) Coordinate with all the parties in assisting CMRL in the preparation of public relations information. 24) Review of Design and plan the traffic management plan during construction. 25) Assist CMRL to organize Traffic Management. 26) Supervise the identification of underground utility facilities and buried materials (e.g. existing foundations). 27) Assist CMRL for supervision of utility relocation until the completion of consulting service. 28) Review the relevant social requirements applied to Chennai Metro Rail Project Phase1. 29) Analyse the risks and vulnerabilities for social issue in construction. 30) Develop the tender documents in preparing social requirements. 31) Review existing Signalling system specification and update Employer's Requirements. 32) Prepare list and specification for Equipment for rolling stock, depot and Emergency recovery vehicles. 33) Work with other experts concerned with Signalling, PSD and Telecom. 34) Prepare tender documents for contract for Signalling, PSD and Telecom. 35) Attend to the pre-bid conference and prepare answer to the questions rose by bidders related to Signalling, PSD & Telecom. 36) Technically evaluate documents submitted by bidders. 37) Verify completed work and prepare request for payment to contractors 38) Certify progress claim from Contractor

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
56	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position code A1(c) (Newly added)		A1(c) | Senior System Iintegration Expert Level 2 | 1) Report to Project Director. 2) Interface with Civil, E&M, Track and System packages. 3) Review integration portion of all System packages. 4) Review the 3-D models/ drawings submitted by all Civil, MEP and System contractors. 5) Ensure integration of all Systems. 6) Testing & Commissioning of all the Systems. 7) T&C plan and manual preparation including for PTW and Power block regime, control and management in Depot and Mainline. 8) Coordination for various trials including for RDSO,CMRS and Other statutory requirements. 9) Testing & Commissioning- Planning, Coordination:- a. System Integration, managing interfaces and coordination of works among different contractors employed for the project. b. Perform the inspection of the works for T&C activities. c. Plan and supervise integrated testing & commissioning and carry out test during commissioning. d. Witness critical tests including static and dynamic integration tests, trial runs, and system performance demonstrations. e. Validate integration test reports and ensure defects/non-conformities are tracked to closure.
57	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A3 Major Tasks and Duties	(1) Report to Project Director.	(1)Report to Deputy Project Director.
58	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A4	(1) Report to Project Director.	(1)Report to Deputy Project Director.
59	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A5	(1) Report to Project Director.	(1)Report to Deputy Project Director.
60	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A6	(1) Report to Project Director.	(1)Report to Deputy Project Director.
61	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A7	(1) Report to Project Director.	(1)Report to Deputy Project Director.
62	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A8	(1) Report to Project Director.	(1)Report to Deputy Project Director.
63	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A13	(1) Report to Project Director.	(1)Report to Deputy Project Director.
64	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A14	(1) Report to Project Director. (12) Evaluate bid documents and recommend Project Director the evaluated lowest bidder.	(1)Report to Deputy Project Director. (12) Evaluate bid documents and recommend Deputy Project Director the evaluated lowest bidder.
65	Section - 5	Terms of Reference (TOR)	Chapter-5, Table 2: Scope of Work for experts : Position Code A15	(1) Report to Project Director. 5) Verify statements submitted by the Contractor to enable team leader to issue payment certificates such as interim payment certificates and final payment certificate;	(1)Report to Deputy Project Director. 5)Verify statements submitted by the Contractor to enable Deputy Project Director to issue payment certificates such as interim payment certificates and final payment certificate;

<table>
<tr><th>S. No.</th><th>Part/Section No.</th><th>Section</th><th>Clause No.</th><th>Original Bid Condition</th><th>Revised Bid Condition</th></tr>
<tr><td>66</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Table 2: Scope of Work for experts : Position Code A16</td><td>(1) Report to Project Director.

4) Advise the Project Director any action required from the Employer.</td><td>(1)Report to Deputy Project Director.

(4) Advise the Deputy Project Director any action required from the Employer.</td></tr>
<tr><td>67</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Table 2: Scope of Work for experts : Position Code A17</td><td>Interface Expert
Level 3</td><td>DELETED</td></tr>
<tr><td>68</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Table 2: Scope of Work for experts : Position Code A18</td><td><table><tr><td>A18</td><td>Safety Expert
Level 3</td><td>1) Report to Team Leader.
2) Review the relevant environment, health and safety requirements applied to Chennai Metro Rail Project Phase 1.
3) Analyse the risks and vulnerabilities for environment, health and safety in construction.
4) Develop the tender documents in preparing environment, health and safety requirements.
5) Prepare guidelines for construction safety to be followed by Suppliers.</td></tr></table></td><td><table><tr><td>A18</td><td>Safety Expert
Level 3</td><td>1) Report to Project Director.
2) Review the relevant environment, health and safety including operational safety requirements applied to Chennai Metro Rail Project Phase 1.
3) Analyse the risks and vulnerabilities for environment, health and safety in construction and operational safety.
4) Develop the tender documents in preparing environment, health and safety including operational safety requirements
5) Prepare guidelines for construction and operational safety to be followed by Suppliers and contractors.
6) Construction supervision of civil and system packages including construction safety.</td></tr></table></td></tr>
<tr><td>69</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Chapter-6 Deliverables table Sl. No. 2,3 &4</td><td><table><tr><td>2.</td><td>Submission of Construction Reference Drawing (CRD)/Good For Construction (GFC) Drawing along with LDC certificate for Civil package</td><td>Design Documents</td><td>60 Days..</td></tr><tr><td>3.</td><td>Submission of Construction Reference Drawing (CRD)/Good For Construction (GFC) Drawing along with LDC certificate for Track and E&M packages</td><td>Design Documents</td><td>90 Days..</td></tr><tr><td>4.</td><td>Review of DDC design and Deliverables for Approval of CRD/GFC Drawings</td><td>Design review reports for DDC</td><td>85 Days for Civil.
110 Days for Track and E&M.</td></tr></table></td><td>DELETED</td></tr>
<tr><td>70</td><td>Section - 5</td><td>Terms of Reference (TOR)</td><td>Chapter-5, Chapter-6 Deliverables table Sl. No. 5</td><td><table><tr><td>5.</td><td>Basic design for System packages
(Chapter 1- Clause 2, For all Packages except S.No. 6,7&8.)</td><td>a) Design basis reports for systems
b) Final Detailed Design Report
c) Final Design Report
d) Cost Estimate Report</td><td>As per below

170 Days</td></tr></table></td><td><table><tr><td>5.</td><td>Basic design for System packages, preparation and submission of tender document to CMRL
(Chapter 1- Clause 2, For all Packages except S.No. 6,7&8.)</td><td>a) Design basis reports for systems
b) Final Detailed Design Report
c) Final Design Report
d) Cost Estimate Report
e) Final tender document</td><td>As per below

~~170~~ 120 Days</td></tr></table></td></tr>
</table>

S. No.	Part/Section No.	Section	Clause No.	Original Bid Condition	Revised Bid Condition
71	Section – 5A	Detailed Design Consultant-Scope of Works			Section 5A of the tender No. CMRL-P1-PMC-01-2025, is revised and attached as Annexure03 to the Corrigendum 4.
72	Section - 6	General Conditions of Contract & Special Conditions of Contract	clause 29.1	**Replace with the following:** The Consultant shall provide the Employer with a Performance Guarantee for 3% of contract value within 21 Days from the date of Letter of Acceptance in the form of Bank Guarantee (as per format enclosed in Appendix B) /E-PBG provided by an Indian branch of Public Sector Undertaking (PSU) Bank based in India that is acceptable to the Employer. 3% of agreed contract value stated in the Letter of Acceptance suitably adjusted in the event of modification of Contact Value under GCC clause 16.	**Replace with the following:** The Consultant shall provide the Employer with a Performance Guarantee for 3% of contract value within 21 Days from the date of Letter of Acceptance in the form of Bank Guarantee (as per format enclosed in Appendix B) /E-PBG provided by an Indian branch of Public Sector Undertaking (PSU) Bank or any Scheduled Commercial Banks in India that is acceptable to the Employer. 3% of agreed contract value stated in the Letter of Acceptance suitably adjusted in the event of modification of Contact Value under GCC clause 16.
73	Section - 6	General Conditions of Contract & Special Conditions of Contract	clause 43.3	For the positions not mobilized immediately after signing of contract, Clause GCC 42.5 shall apply. In case of revision of remuneration rates as specified in Clause GCC 42.5 or replacement of positions, the base index Ilo shall be the official index for salaries in the Client's country for the month of the mobilization of the Expert in that respective position. The adjusted rates as determined shall be applicable to an Expert on an annual basis from their respective mobilization dates in that respective position.	For the positions not mobilized immediately after signing of contract, Clause GCC 43.5 shall apply. In case of revision of remuneration rates as specified in Clause GCC 43.5 or replacement of positions, the base index Ilo shall be the official index for salaries in the Client's country for the month of the mobilization of the Expert in that respective position. The adjusted rates as determined shall be applicable to an Expert on an annual basis from their respective mobilization dates in that respective position.
74	Annexure-2				Annexure-2 of tender document is revised and attached.
75	BOQ				BOQ for tender No. CMRL-P1-PMC-01-2025 is revised and being uploaded in CPP portal.
76	Tender Document				The Tender Documents for tender No. CMRL-P1-PMC-01-2025, revised as Revision 01, incorporating all the modifications from this corrigendum, is being uploaded in CPP portal.

ANNEXURE-1 TO CORRIGENDUM 5

APPENDIX A -BOQ SPREADSHEET TEMPLATE
(FOR REFERENCE PURPOSE ONLY)

DETAILS NOT TO BE SUBMITTED IN TECHNICAL BID. BOQ SPREAD SHEET UPLOADED AND AVAILABLE IN E-PROCUREMENT PORTAL TO BE FILLED AND SUBMITTED.

Validate | Print | Help | Item Wise BoQ

Tender Inviting Authority: CHENNAI METRO RAIL LIMITED

Name of Work: Selection of Project Management Company (PMC) for Chennai Metro Rail Phase 1 Network Capacity Enhancement Project

Contract No: CMRL-P1-PMC-01-2025

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender.
Bidders are allowed to enter the Bidder Name and Values only. Evaluation shall be done without GST)
Note: All Data Entered by the Bidder in this BoQ Sheet will take precedence over the data entered in any other places of the Financial Bid.

NUMBER #	TEXT #	TEXT #	NUMBER #	TEXT #	TEXT	NUMBER #	NUMBER	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Item Code	Quantity (Total Man/Months)	Category	Level	BASIC RATE (Per mannonth for Schedule-A and Lumpsum for Schedule B &C) In Figures To be entered by the Bidder in Rs. P	GST in %	TOTAL AMOUNT excluding taxes in Rs. P	TOTAL AMOUNT including taxes Rs. P	TOTAL AMOUNT In Words
1	2	3	4	5	6	7	8	11	12	13
1.00	**Schedule-A: Remuneration – PMC Services**									
2.00	Project Director	Item1	48.00	Pro-A	L1			0.00	0.00	INR Zero Only
3.00	Deputy Project Director	Item2	48.00	Pro-A	L1			0.00	0.00	INR Zero Only
4.00	Senior System Integration Expert	Item3	48.00	Pro-A	L2			0.00	0.00	INR Zero Only
5.00	Senior Rolling Stock Expert (1)	Item4	48.00	Pro-A	L2			0.00	0.00	INR Zero Only
6.00	Senior Rolling Stock Expert (2)	Item5	48.00	Pro-A	L2			0.00	0.00	INR Zero Only
7.00	Senior Track Expert	Item6	24.00	Pro-A	L2			0.00	0.00	INR Zero Only
8.00	Senior PS&OHE Expert	Item7	24.00	Pro-A	L2			0.00	0.00	INR Zero Only
9.00	Senior Civil Expert	Item8	24.00	Pro-A	L2			0.00	0.00	INR Zero Only
10.00	Senior Signaling Expert	Item9	36.00	Pro-A	L2			0.00	0.00	INR Zero Only
11.00	Senior PSD Expert	Item10	24.00	Pro-A	L2			0.00	0.00	INR Zero Only
12.00	Senior Telecom Expert	Item11	24.00	Pro-A	L2			0.00	0.00	INR Zero Only
13.00	Rolling Stock Expert (1)	Item12	36.00	Pro-A	L3			0.00	0.00	INR Zero Only
14.00	Rolling Stock Expert (2)	Item13	36.00	Pro-A	L3			0.00	0.00	INR Zero Only
15.00	Signaling Expert	Item14	24.00	Pro-A	L3			0.00	0.00	INR Zero Only
16.00	PSD Expert	Item15	24.00	Pro-A	L3			0.00	0.00	INR Zero Only
17.00	Telecom Expert	Item16	24.00	Pro-A	L3			0.00	0.00	INR Zero Only
18.00	E&M Expert	Item17	24.00	Pro-A	L3			0.00	0.00	INR Zero Only
19.00	Contract Expert	Item18	48.00	Pro-A	L3			0.00	0.00	INR Zero Only
20.00	Finance Expert	Item19	48.00	Pro-A	L3			0.00	0.00	INR Zero Only
21.00	Planning Expert	Item20	24.00	Pro-A	L3			0.00	0.00	INR Zero Only
22.00	Safety Expert	Item21	36.00	Pro-A	L3			0.00	0.00	INR Zero Only
23.00	Rolling Stock Engineer (1)	Item22	37.00	Pro-B	B1			0.00	0.00	INR Zero Only
24.00	Rolling Stock Engineer (2)	Item23	37.00	Pro-B	B1			0.00	0.00	INR Zero Only
25.00	Rolling Stock Engineer (3)	Item24	37.00	Pro-B	B1			0.00	0.00	INR Zero Only
26.00	Rolling Stock Engineer (4)	Item25	37.00	Pro-B	B1			0.00	0.00	INR Zero Only
27.00	Signaling Engineer (1)	Item26	36.00	Pro-B	B1			0.00	0.00	INR Zero Only
28.00	Signaling Engineer (2)	Item27	36.00	Pro-B	B1			0.00	0.00	INR Zero Only
29.00	PSD Engineer	Item28	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
30.00	Telecom Engineer	Item29	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
31.00	OHE Engineer (1)	Item30	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
32.00	OHE Engineer (2)	Item31	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
33.00	Track Engineer	Item32	25.00	Pro-B	B1			0.00	0.00	INR Zero Only
34.00	Civil Engineer (1)	Item33	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
35.00	Civil Engineer (2)	Item34	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
36.00	Civil Engineer (3)	Item35	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
37.00	E&M Engineer (1)	Item36	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
38.00	E&M Engineer (2)	Item37	24.00	Pro-B	B1			0.00	0.00	INR Zero Only
39.00	Assistant – Finance	Item38	48.00	Pro-B	B1			0.00	0.00	INR Zero Only
40.00	Interface Engineer	Item39	36.00	Pro-B	B1			0.00	0.00	INR Zero Only
41.00	Document controller and admin support (1)	Item40	48.00	Pro-B	B2			0.00	0.00	INR Zero Only
42.00	Document controller and admin support (2)	Item41	48.00	Pro-B	B2			0.00	0.00	INR Zero Only
43.00	Document controller and admin support (3)	Item42	48.00	Pro-B	B2			0.00	0.00	INR Zero Only
44.00	Document controller and admin support (4)	Item43	48.00	Pro-B	B2			0.00	0.00	INR Zero Only
45.00	**Schedule-B: Reimbursable Expenses for PMC services**									
46.00	Total Reimbursable Expenses for PMCS for the Assignment period (B)	Item44	1.00	Lumpsum	Lumpsum			0.00	0.00	INR Zero Only
47.00	**Schedule-C: DDC Cost**									
48.00	Total DDC Cost for the Assignment period (C)	Item45	1.00	Lumpsum	Lumpsum			0.00	0.00	INR Zero Only
Total in Figures								0.00	0.00	INR Zero Only
Quoted Rate in Words								INR Zero Only		

Annexure-2 to Corrigendum -5

Form FIN-5 Apportionment of DDC Cost – (SCHEDULE -C)

DETAILS NOT TO BE SUBMITTED IN TECHNICAL BID. IT SHALL BE FILLED AND UPLOADED ONLY IN THE PRICE BID DOCUMENT OF E-PROCUREMENT PORTAL.

No.	Description	Apportionment in (%)	Breakdown of Apportionments (%)	Total Price Excluding Tax	Tax	Total Price including Tax
1	**Civil Design Works**					
1. 1	Preparation and submission of Conceptual design	50%	5			
1.2	Preparation and submission of Definitive Design including soil investigation, assessment of infringement with the existing utilities/services.		10			
1.3	Preparation and submission of Construction Reference Drawings and Combined Services Drawing for tender purpose		15			
1.4	Preparation and Submission of Bid Document for procurement of construction contracts to Employer		5			
1.5	Preparation and submission of" Good For Construction Drawing"		10			
1.6	Site Coordination and Interface for the complete period of the Assignment.		5			
2	**E&M Design Works**					
2.1	Preparation and submission of Preliminary Design/Preparation and submission of Definitive Design..	20%	2			

2.2	Preparation and submission of Construction Reference Drawing (CRD along with LDC certificate.		3			
2.3	Obtaining Approval of CMRL for CRD/GFC Drawings		3			
2.4	Preparation and Submission of Bid Document for procurement of construction contracts to Employer.		5			
2.5	Preparation and submission of GFC drawing.		2			
2.6	Site Coordination and Interface for the complete period of the Assignment.		5			
3	**Track Design Works**					
3.1	Study the existing track alignment and land availability within the depot and on the connection tracks. Based on this, prepare a new alignment within the existing depot boundary to accommodate the proposed additional rolling stock and simplify train feeding to the mainline.	30%	2			
3.2	Preparation and submission of Preliminary Design and Definitive Design.		5			
3.3	Preparation and submission of Construction Reference Drawing (CRD) along with LDC certificate and obtain approval from Employer. Updating of Combined Service drawings and validation.		3			
3.4	Preparation and submission of Tender Document with drawings to execute the Track construction works.		10			
3.5	Preparation and submission of GFC drawing		5			
3.6	Site Coordination and Interface for the complete period of the Assignment.		5			
	Total DDC Cost	100%	100%			

Note:

1. Please refer Section 5A Detailed Design Consultant Scope of works.
2. Documents to be submitted accordance with the requirements mentioned in the Scope of Works of DDC.
3. The Payment shall be claimed for Sl. No 1.6, 2.6 and 3.6 after completion of the assignment.

Terms of Payment for DDC Price

1. Upon completion of each of the above Milestone Activity in compliance to the requirements of this Contract, the Consultant shall obtain 'Notice of No Objection' from the Client.
2. Notice of No Objection shall be obtained from each of the Milestone Activity after its completion.
3. Contractor may request CMRL for release of partial payment for the particular milestone, which obtained No Objection With Comments. Release of partial payment shall be at the discretion of CMRL.

Annexure-3 to corrigendum-5

Section 5A.

Detailed Design Consultant- Scope of Works

GENERAL

INTRODUCTION

The Employer has endeavoured to delineate the scope of the Services to be provided by Detailed Design Consultant in this volume. Such descriptions are not intended to be comprehensive, it being understood that Design Consultant shall be required, without adjustment or addition to the fixed rates or compensation agreed to herein, each item of work to provide any services, whether or not listed herein that are within the scope of its field of professional practice and that are reasonably inferable as being necessary, or that would be customarily furnished by other providers of professional services of the type and nature provided for in this Agreement, to accomplish the Services set forth in this volume. The Consultant shall provide and complete the Consultancy Services, to the standards and in the manner, frequency, quantity and times specified in accordance with the Conditions of contract, except for variations which have been agreed to in writing by the Employer. DDC shall perform services relating to the Project.

DDC shall exercise reasonable skill, care and diligence in the performance of his obligations under the Agreement and in accordance with the prevailing standards of the profession. The DDC shall provide professional, objective and impartial advice and at all times hold the Employer's interests paramount.

Where the Services include the co-ordination between the DDC and other consultants and Contractors employed on the Project, the DDC shall provide such co-ordination. The DDC shall obtain, co-ordinate and submit to the Employer for his information and approval of all details, drawings, arising from such coordination with others. Such co- ordination will take place throughout the contract period.

Relevant Documents

CMRL has already prepared a Detailed Project Report for Assessment of Additional Rolling Stock Requirement for Chennai Metro Rail Phase-1 Network Operations to Cater Future Passenger Demand, of Chennai Metro rail, and the design stages will be broadly based on this study.

The PMC shall engage suitable experts as Detailed Design Consultant (DDC) and shall appoint an external reputed firm as Lead Design Checker (LDC). The field of intervention of the Detail Design Consultant will be in the following disciplines: Civil-Structural Works, Track works, Architecture design works and Building Services (E&M, VAC, etc.) as specified in this scope of works.**PURPOSE OF THIS DOCUMENT**

This document describes the General Scope of Services to be provided by the consultant.

The Consultant is required to provide comprehensive design services exclusive for metro works in complex urban environment including the final draft of Tender documents for the construction contracts.

Therefore, it is imperative that the Consultant has the requisite expertise in preparation of cost estimates, bid documents (pertaining to international loan giving agencies such as JICA, world bank, ADB etc.), Detailed Design, design support during execution with Proven experience in handling major construction projects of similar nature and magnitude.

Keeping in view the design services, the procurement of construction contracts and the design support during construction, it will be necessary to carefully plan the activities for efficient execution. The Consultant is expected to reflect this requirement in their Technical and Financial proposals when detailing the quantum of planning and design work to be undertaken.

Extent of Design Services:

a) At stations (UG/Elevated)
   1. Validation of the existing civil provisions at platform level to accommodate two additional cars of Rolling Stock.
   2. Design and preparation of drawings (both architectural and structural) for the civil facilities required to be modified/constructed to accommodate additional cars
   3. Interface with all stakeholders involved for the above deliverables.
   4. Preparation of the cost estimate for the modifications to be done and the additional structures/facilities to be constructed.

b) Civil works At Depot
   1. Preparation of topo drawings of the existing structures/facilities at depot including the underground and overhead services.
   2. Conduct all necessary Geotechnical/soil investigation and submission of reports
   3. Study ,prepare and submission of reports on the modifications covering both structural and architectural aspects required to be implemented at depot for both structures and other existing utilities.
   4. Structures to be planned and designed in such a way having least disturbance on the existing utilities/Services. However, any utilities/services required to be relocated the consultant has to submit necessary proposal including design and drawings for the permanent diversion of such utilities/Services.
   5. Preparation of "conceptual& Preliminary design & drawings" to accommodate the required additional facilities with due interface with all stakeholders involved.
   6. Design and submission of "Definitive Drawing" for structural, architectural works of the new structures to be constructed and the existing structures required to be modified.
   7. Preparation and Submission of "Construction Reference Drawing" to enable Employer to issue tenders for construction works
   8. Preparation and submission of "Good For Construction" drawing upon award of construction contracts.
   9. The DDC has to Interface with all stakeholders involved for the above deliverables.
   10. The DDC has to prepare and submit the cost estimate for the new structures to be constructed and the structures required to be modified

11. Road alignment drawing including design for the internal road required to be realigned to accommodate the additional facilities at depot.

c) Track work at Depot

1. Study the existing track alignments and utility provisions at depot and depot connection tracks.
2. Propose an alignment to accommodate the additional rolling stock as per Detailed Project Reports, considering the existing utility provisions and additional depot connections are to be proposed
3. Prepare a detailed geometric alignment, including a plan and profile, for the depot section and depot connections to ramp/mainline.
4. Prepare a Design Basis Report (DBR) and Detailed Design Calculations (DCN) for the different forms of track structures to carry out day-to-day maintenance activities.
5. Prepare and submit a preliminary and detailed design of track structures as per RDSO and international standards.
6. Submit an outline design and construction specifications for track accessories. This includes reviewing supplier design documents and interface drawings.
7. Submit construction drawings in the following stages: conceptual drawings, preliminary drawings for approval, Construction Reference Drawings, Good for Construction drawings, and validation of the shop drawings.
8. Interface with civil and system departments for a holistic design approach.
9. All designs and drawings produced under the scope of works shall be proof checked by a suitably qualified person who will act as the lead design checker (LDC).
10. Review the as-built drawings of new lines and prepare an as-built drawing for the entire depot, including both existing (old lines) and new lines.

d) E&M work at Depot & Stations

1. Study the existing E&M Systems provisions at depot and Stations.
2. Propose an additional E&M Systems to accommodate the additional rolling stock as per Detailed Project Reports, considering the existing utility provisions and additional depot connections are to be proposed
3. Prepare a Design Basis Report (DBR) and Detailed Design Calculations (DCN) to carry out day-to-day maintenance activities.
4. Submit an design and construction specifications for E&M accessories. This includes reviewing supplier design documents and interface drawings.
5. Submit construction drawings in the following stages: conceptual drawings, preliminary drawings for approval, Construction Reference Drawings, Good for Construction drawings, and validation of the shop drawings.
6. Interface with civil and system departments for a design approach.
7. All designs and drawings produced under the scope of works shall be proof-checked by a suitably qualified person who will act as the lead design checker (LDC).
8. Review the as-built drawings of new or proposed E&M Systems and prepare an as-built drawing for the entire depot, including both existing and new E&M Systems.

e) General

1. Preparation of Bid documents including Bill of Quantities, Technical Specifications, Drawings etc., for Civil, E&M and Track works.
2. Assistance to Employer during procurement of construction contracts for Civil, E&M & Track works.

Note: The quantities are approximate quantities as per DPR, which may change in the final alignment at Detailed design stage.

These Services generally include, but are not limited to:

a) DDC is required to propose suitable construction methodology after due approval from CMRL for the works like Cast in-situ and Pre-Cast Construction, designs of tracks, Design of MEP. VAC services etc. and prepare and submit comprehensive reports along with the methodologies proposed for finalisation with CMRL before floating of tenders for construction works.
b) Checking and approval of design of enabling works/ temporary works and scheme of construction suggested by the Contractor for Depot construction. elevated, sub-structure, viaduct etc. as applicable.
c) Drawings for construction shall be in such detail as not to require further design of detailing to be carried out by the construction contractor except preparation of shop drawings.
d) Perform detailed designs for with architecture finishes and services including illuminations, lifts, pits escalators, pits water supply, drainage, power supply and other amenities

   Review and suggest change as necessary in the designs/ plans or for temporary and permanent diversion works for all utilities affected by the works.

e) Co-ordinate and integrate designs and details with contractors and consultants employed by CMRL working on contracts pertaining/relevant to the site of works for this contract regarding DDC's drawings
f) Prepare and update during construction Combined Services Drawings (CSD), Structural-Electrical-Mechanical Opening Drawings (SEM) and Identify embedded items/openings indicating system wide information for the purpose of E & M co- ordination and civil construction interfaces.
g) Prepare BOQs, special specifications, construction cost estimates for the associated construction contracts for tendering by CMRL. The BOQs, special specifications, construction cost estimate is to be prepared for stations and Depot in a number of packages as decided by CMRL so as to facilitate CMRL to call construct only tenders in different contract packages.
h) Incorporate and co-ordinate changes in design due to system wide interfacing with other DDCs/Contractors/ CMRL.
i) Incorporate changes in design resulting from CMRL's design reviews.
j) Consult and co-ordinate with various City and Government authorities that interface with the CMRL project. CMRL will assist with the co-ordination.
k) Prepare necessary documentation and obtain necessary planning and other required approvals for the integrated complex consisting of Depot designs, Station layouts, space

proofing, track supporting structures including E&M facilities and fire detection suppression system ,

l) 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 CMRL:
m) Maintain a Quality Control activity and an effective internal procedure for checking the accuracy of Work and assuring compliance with contract requirements.
n) Attend meetings connected with the Work whenever required, and
o) Make available their 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 site supervision staff in clarification of queries resulting from the design; to review and confirm Contractor prepared "As- Built drawings.
p) DDC should keep in mind that they should provide best options, methodologies, strategies by way of value engineered and optimized design suited for best interest of CMRL. Any new methodology proposed should be analysed properly in terms of time, cost, suitability, affordability, availability of the same locally. Any detail, methodology, strategies, facilities adopted in the design without prior concurrence from CMRL discovered at any later stage causing damage, defect, incurring additional expenditure to exchequer, adversities, speculative bidding due to ulterior motives etc., or deteriorating image and interests of CMRL, will attract penalty as determined by CMRL and should be corrected by DDC at their own time and expenses.
q) The DDC shall solely be responsible for manpower resource planning to accommodate variations in schedule during the estimated design period, and such variations shall not constitute a claim for extended design services unless these variations are not due to the DDC.

STANDARDS AND CODES

a) Designs and drawings shall comply with all applicable local rules, regulations, standards and codes. Apart from this international standards and codes for best practices shall be adopted. DDC shall submit the copies of codes and standards being followed to Employer. Any additional requirements imposed by local agencies not listed above shall be incorporated into the designs. Local codes, rules, regulations and standards shall take precedence where their standards or requirements are more onerous than other international standards.
b) DDC shall use the RDSO approved guidelines for preparation of design basis reports, Project Report (DPR), SOD of CMRI.phase-1, relevant codes and standards to propose Outline Design Criteria and any other design specifications for approval by CMRL as the basis for developing the full design, Construction reference Drawings, Cost Estimates and BOQs for all civil and system disciplines (civil, Architecture, Structure, MEP, VAC) works.
c) Civil and Systems shall comply with the codes of practice, standards, specifications and manuals wherever specified.

National Building Code of India, 2016

The Guides of the Chartered Institution of Building Services Engineers Acceptable Internationally recognised standards for this Contract are:

ANSI	**American National Standards institute**
ASME	**American Society of Mechanical Engineers**
ASTM	**American Society for Testing and Materials**
BS	**British Standards**
BIS	**Bureau of Indian Standards**
DIN	**Deutsche Industrie Normen**
IEC	**International Electro Technical Commission**
IEEMA	**Indian Electrical and Electronics Manufacturers Association**
JIS	**Japanese Industrial Standards**
NEC	**National Electrical Code (NFPA 70)**
NEC	**National Electrical Code (Indian)**
NEMA	**National Electrical Manufacturers Association**
NFPA	**National Fire Protection Association**
VDE	**Verb and Deutsche Elektrotechniker**
BS 7671: 1992	"Requirements for Electrical Installations"

In case, standards and Codes for any specific element are not defined in documents referred to in this clause, DDC may use applicable Standard or Code with the approval of CMRL.

a) Unless otherwise stated, the E & M. VACdesigns and execution shall comply with all applicable local regulations issued by the agencies listed below:
   Indian Electricity Rules
   Indian Electricity Act
   National Building Code
   Chief Inspector (Electrical), Govt. of Tamil Nadu
   Central Pollution Control Board
   TNFRSD Fire Services
   Tamil Nadu Public Works Department
   Central Public Works Department
   TNEB, Power Supply Utilities
   CMDA
   Indian Railways
   Municipal Corporations of Chennai
   CMWSSB
   National Safety Council
b) Any requirements imposed by local agencies not listed above shall be incorporated into the designs. Local codes, regulations and standards shall take

precedence where their standards or requirements are more onerous than other international standards.

The design of any one system shall be to a single code or specification. Parallel use of different codes for one particular item or component shall not be allowed Should the DDC propose to use alternative Standards or Codes of Practice, they shall submit of these with justification for their use to CMRL for review and acceptance.

Presentation Material, Working Models and Samples

The DDC shall provide information covered by this Design Lot for such purposes of presentation or display as Employermay require. Information shall consist of material in the form of descriptions of the Works executed and the resources and manpower employed and shall include graphs and sketches and photographs for inclusion in publications or for making into displays and exhibits.

TENDER DOCUMENTATION

The DDC will prepare the Tender Documents for the Civil, E&M and Track works. All designs and documentation produced by the DDC shall provide sufficient information and detail so that the bidders can quote reasonably. Tender and Contract Drawings, Specifications and other information produced by the DDC for construction, or revisions of such documents, shall be submitted to the Employer, in sufficient time for review and further issuance of a comprehensive package to the contractor. The DDC shall ensure that these documents are produced in a timely manner such that the construction contractor is able to plan and execute its works in accordance with the contract, including the construction programme.

The DDC shall prepare the Bills of Quantities, Special Conditions of Contract and Technical Specifications, including the Scope of Work and tender drawings. The tender document shall contain separate details of (i) MEP works, (ii) fire suppression/fighting and (iii) civil, structural architectural & related Allied works (iv) Tracks works (v) and allied works (vi) Tables of vertical Circulation Equipment's etc.

AMENDMENTS TO TENDER DOCUMENTS

The DDC shall provide additional design and other information not included in the Tender Documents as may be required by the Employer.

This shall include, but not be limited to:

- Amendments as appropriate to the Bills of Quantities.
- Draft written replies to tenderers queries where relating to the DDC's design;
- Addenda to tender documents and drawings.
- Technical clarification for technical proposal of the bidders whenever required.

Contract Drawings

The DDC shall submit to the Employer, a complete set of "Good for construction (GFC)" drawings for that contract along with complete set of CAD files in CD ROM. Revisions of design and issuance of revised drawings due to site constraints or modifications arising out system wide contractors' requirement etcetera during execution of works shall be the responsibility of DDC without any cost implications.

SYSTEM-WIDE INFORMATION

1. The DDC, for system wide requirement, interface information etc., necessary for the design of civil and other structures, shall use the information available from CMRL phase 1 network.
2. The DDC shall incorporate full and final information relating to system-wide requirement and services into the CSDs before the design of the relevant items as per agreed schedule. However, DDC will also interface with other DDC's / contractors for obtaining necessary inputs, The timings for issue of the SDs, will be determined by the CMRL depending upon the award of the E & M Contracts. Final system-wide requirements defined by CSDs and those required by Systems and by E&M Contractors shall be Incorporated into the SEM and structural drawing for construction. The DDC shall prepare and issue intermediate submissions of the structural requirements as necessary to meet the construction schedule. The DDC shall ensure compatibility of Design with various system-wide works as and when updating process in conjunction with design development existing towards the completion of the structural works.
3. The DDC shall design the embedded items and include these works in the respective civil contracts as required. The interface between the civil contractor's work and the system-wide work shall be clearly defined.

Liaison Work

The DDC shall provide necessary reports and drawings for approval and clearances from concerned local authorities.

MONTHLY PROGRESS MEETINGS

The DDC will attend monthly progress meetings and required to produce:

a) 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.
b) An updated copy of the progress registers showing the titles and status of all drawings and documents (with drawing index sheet as per Performa agreed by Employer).

Interaction with the Employer/ stakeholders

During entire period of services, the Consultant shall assist Employer and provide any clarification as regards methods being followed and carryout modification as suggested by the Employer. The stakeholders are southern railway, Chennai Corporation, CMDA, CMWSSB various departments of TN Govt. etc.

The Client and other Government officers may visit the site at any time, individually or collectively to acquaint themselves with the site, consultant representative to be present to clarify if required.

CONFIDENTIALITY OF ESTIMATES AND DESIGN BUDGETS

All estimates shall be treated as strictly confidential and shall be submitted by the DDC in sealed envelopes separately from other documents that it is required to provide. Any malpractices and leakage of confidential information of any nature will be view seriously and amount to breach of contract.

Deficiencies of services

Deficiencies on part of the Consultant should be made good by the consultant without any cost and time implications to the Employer. Deficiencies may include but not limited to:

a) Not performing the Services as per the Contract for Consultant's Services and undue delay in submission of designs & reports.
b) Not acting impartially or acting in collusion with the contractor
c) Failure to give proper and timely advice to the Client or the contractor to enable correction during execution
d) Lack of proper coordination with the Client and the contractor to ensure smooth implementation of the Project
e) Permitting sub-contracting of any works without authorisation by the Client.

CHAPTER 1

PHASES OF SERVICES

(DESIGN PHASE AND CONSTRUCTION PHASE)

1.1 The Consultant shall perform the services in two phases, the Design Phase and the Construction Phase.

1.2 The Design Phase shall commence upon the Commencement of services (COS) Date. This phase shall include the preparation and submission of:

a) The Preliminary Design
b) The Definitive Design; and
c) The Construction Reference Drawings.
d) Good for construction (GFC) drawings
e) Preparation of Tender documents

1.3 The consultant is expected to transfer the knowledge gained and lessons learnt during PD (Preliminary drawing) & DD (Definitive Design) stages to the production of Construction Reference Drawings (CRD)/ Good for construction (GFC) drawings.

1.4 The Design Phase will be completed upon the issue of a Notice by the Employer in respect of the comprehensive and complete Construction Reference Drawings Submission for the whole of the Permanent Works.

1.5 During Construction Phase DDC is required to produce GFC drawings detailed out to enough extent sufficient for construction and review working drawings prepared by the contractors. Also based on Mock-ups/ samples/patterns/schemes approved by CMRL pertaining to civil, structural, architectural and building finishes works, DDC should review shop drawings submitted by the contractors to conform the GFC drawings.

1.6 In addition, DDC should provide technical and all other necessary support for the evaluation and review of contractor's variation claims (if any)

1.7 DDC shall Review the proposal of rectification and repair methodology pertaining to structural works upon request from contractor/ Employer/ and submit necessary additional designs, drawings and necessary technical documentation as required to the Employer

1.8 SAFETY CERTIFICATION BY CRS

The Consultant shall note that the Commissioner for Metro Railway Safety (CRS) will inspect the Works from time to time for the purpose of determining whether the Chennai Metro Rail Phase complies, in terms of operational and infra structural safety, in accordance with the Laws of India. The Consultant shall note that CRS approval is mandatory for commissioning the system. Notwithstanding other provisions of the Contract, the Consultant shall ensure that the Design Works comply with the requirements of CRS in terms of being constructed to the drawings, and consultant upon notice by Employer shall assist the representatives of CRS in carrying out their inspection duties and comply with their instructions regarding rectifying any defects and making good any deficiencies. Design Basis Report for entire alignment with Lead Design Certificate should be submitted.

CHAPTER 2

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS: (SURVEY AND INVESTIGATION)

2.1 **Topo Survey**: The basic objective of the survey would be to capture the essential ground features at the site in order to consider improvements and for working out improvements and upgrading costs.

2.2 GIS/ GPS survey, coordinates and benchmarks

2.3 The consultant shall study the existing maintenance lines, mainline Entry/Exit lines and other facilities at the Depot and shall prepare the Detailed Design for all the requirements of this project.

The DDC shall carry out all necessary analyses and collect any information or data like rain fall, High flood level (HFL), seismic data etc. which is necessary for its design development.

2.4 The DDC shall prepare a report on all survey works undertaken, including checks on mapping, survey stations, co-ordinates, setting out, etc.

2.5 Geo-technical investigations and sub-soil explorations adopting relevant IS codes for the proposed structures and other locations as necessary for proper design of the works. Submit interpretative soil investigation report and input data for structural and foundation design for individual buildings/ structures/ equipment etc. Study the existing track alignments and utility provisions at the Depot and the connection track from the ramp/mainline.

2.6 Submit a utility diversion or modification plan that includes specific proposals for diverting utilities such as cable ducts and drainage provisions.

2.7 Propose a modified alignment to accommodate the additional rolling stock as per the Detailed Project Reports. An additional connection track to be proposed to connect the depot to the mainline

2.8 Prepare a detailed geometric alignment, including a plan and profile, for the depot section and connection tracks. Final quantities are to be determined for the tender call for track work execution

CHAPTER 3

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS (CONCEPTUAL & PRELIMINARY DESIGN STAGE)

CONCEPTUAL DESIGN STAGE

a) The DDC shall gather relevant Information and data with respect to existing Chennai Metro Rail Network, leading to the definition of requirements in consultation with the Employer to ascertain the conceptual framework and related requirements. The DDC shall submit a comprehensive system integration report describing their proposal to ensure seamless integration with the existing network.

b) Conceptual architectural planning should be based on the principles of state of the art international metro planning standards including sound principles of transit oriented development, multi-modal integration, property development, signage and way finding environment friendly green building design, barrier-free designs for disabled, inclusive planning, general site planning and landscaping The consultant is required to produce national & International case studies, and should design the station elements & structures with suitable type/scheme/pattern of architectural finishes, furniture, futures etc. based on environmental (green), life safety, fire, and noise requirements apt for metro stations and for all structures in an absolutely exhaustive manner and with due diligence.

c) DDC shall develop a schedule of space requirements for individual structures within the limits of land and refine the space requirements to translate them into design submissions.

d) Design Options Studies (Civil, Structural, Architectural, MEP, VAC)

The DDC shall produce sufficient design options for all structures, systems and services covered in this contract. The DDC shall develop alternative layouts and designs for the substructure, superstructure and architecture of all elements to reduce construction cost without adversely affecting required transit functions such as capacity, service life, and reliability, economy of operation or ease of maintenance. Consultant should prepare Alternate designs to explore various options for review/ recommendations and approval from Employer.

i. Each design alternative shall be presented in sufficient detail to clearly define
ii. The proposed design alternative including:
iii. A description of the proposed design alternative and the comparative
iv. advantages and disadvantages of each.
v. Clearly illustrated sketches, drawings, diagrams, calculations, published reports, written description and other supporting documents for evaluating the proposal.
vi. Concept schedule of materials and finishes

vii. An estimate of the amount of savings in construction/system cost.

viii. Drawings showing single line diagrams for fire detection system layout (Floor-wise), fire suppression and details of various sub-systems sprinkler layout, automatic gas flooding (as applicable)

ix. Case studies, any National International in support of the alternative proposed

x. Passenger circulation model, horizontal and vertical circulation and passageway requirements,

xi. Single line diagram of electrical system excluding panels and DB's, cable sizing etc.

xii. Wiring layout floor wise and external areas. Thes shall include location of DB's. fixture sockets, lighting, fans etc. and writing details

xiii. Upon agreeing to alternative design proposal, the DDC shall completely design and details the work,

xiv. Based on the studies, the DDC shall prepare an initial statement of probable construction cost.

xv. No fee/time extension will be granted to consultant for alternate plans/designs during this stage.

PRELIMINARY DESIGN STAGE:

a) The Preliminary Design shall develop based on outline design criteria along with updated codes and developed sufficiently to define the main structural elements, systems and services.

b) Study of project requirements and control drawings and preparation of design philosophy, basis & criteria for individual buildings, structures, external and internal services and their holistic integration, passenger flow requirements/ circulation & systems.

c) Preparation of preliminary architectural/structural/ MEP/ VAC/ Restoration & landscaping plans including but not limited to, dimensioned plans, existing condition plans, existing utility plans, demolition/ slicing plan, Layout and material plans. MEP/service arrangements, grading and drainage plans, plan enlargements, elevations, internal layout, sections, landscaping details, schematic electrical plans structural designs, water supply and sanitary arrangements & Interior design of stations such as false ceilings, wall cladding, furniture, location of HVAC units Internet connectivity points, surveillance schematics, building management system/

d) Site development plans should include elements like compound wall, roads, footpath, pavements, storm water drains, rainwater harvesting pits, mechanical equipment (including fire safety fixtures), pavements, street-scaping, signage, public furniture & fixtures, etc.

e) Preliminary Traffic Management plan consisting of probable diversion routes, suggested alternatives, Preliminary bus stop relocation plan etc.

f) Ascertain Employer's/stakeholders' requirements and examine site constraints & potential for individual buildings/basement parking/ multi-modal integration, external and internal systems/ services and prepare brief/presentation for

Employer's/stakeholders' review/ recommendation and approval including conceptual control designs/ drawing/ documents and incorporate required changes, If any.

g) Study of input data and preparation of design calculations, schematic drawing for all external services & individual buildings pertaining to internal services such as:
   a. External & Internal Sewerage (grey & black) System.
   b. Rain water harvesting system by way of recharge pits, sumps etc.)
   c. Connection of Internal Services Systems like water supply, sewage/ sewerage disposal, electrical etc. with external services network owned / maintained by concerned authorities.
   d. Street Furniture/ furniture for proposed buildings and other structures.
   e. Internal and External Electrification
   f. Communication System.
   g. Fire hydrant and fire-fighting provisions internally and externally
   h. Flood protection
   i. interior design
   j. signage & illumination
   k. Property development
   l. Flood protection and design
   m. Parking management including bicycle parking

h) Preliminary Estimate, BOQ and specifications The consultant shall prepare preliminary estimates of all buildings, services, works on the basis of the latest plinth area rates/ Schedule of rates of CPWD/TNPWD duly correcting with multiplying factor for the location/area

i) Drawings and Documents to be submitted incorporating:
   a. Property development in proposed stations area.
   b. Infrastructure accommodating all necessary amenities.
   c. Barrier Free Design implementation.
   d. Passive design features.
   e. Implementation of Green building concepts
   f. Ecologically sustainable design, efficient use of energy and natural resources(like solar, wind etc.)
   g. Waste management and recycling proposal.
   h. Optimization of constructability, operability & maintenance.

CHAPTER 4

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS: DEFINITIVE DESIGN

4.1 Based on preliminary drawings the DDC shall prepare the definitive design (DD) documents consisting of plans, elevations (floor-to-floor height, sections, sketches of critical and typical details, perspective, schedule of areas, flooring plans and other necessary drawings, documents and details.

4.2 The DDC shall prepare detailed outline specifications to fix and illustrate the size and character of all architectural and structural elements including allied structures. The DDC shall perform structural design as per relevant codes.

4.3 **Submission of all design with the Lead Designer's certificate**. A certificate signed by the LDC stating that all design, drawings and documents have been checked and approved complying with all relevant codes shall be issued to the Employer's/stakeholders. The person preparing the design and drawing will initial all documents prepared by him. Lead design checker should issue lead design checker review forms for all the issued drawings for all disciplines separately in a suitable format for review and also submit a monthly report in an approved format, without fail.

4.4 The DDC shall prepare detailed designs based on the requirements provided in the contract. 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. Definitive Design shall accord with and incorporate the Preliminary Design and shall be the design developed to the stage at which all elements of the structures are fully defined and specified and in particular:

I. calculation and analysis are complete:
II. all main and all other significant elements are delineated;
III. all tests and trials and all selection of materials and equipment are complete:
IV. Shall take full account of the effect on the Permanent Works of the proposed methods of construction and of the Temporary Works.
V. Interface Management Plan (IMP).

4.5 The DDC shall submit lift shaft dimensions, overrun and pit requirements, equipment and plant room sizes, accessibility to firemen's staircase, fire control and smoke management systems, requirements for lifts and escalators, escalator pits, typical floor beam depths, maximum duct dimension requirements, floor-to-floor heights.

4.6 The DDC shall incorporate in its design, the relevant seismic criteria and earthquake design pertaining to the region.

4.7 The DDC shall submit Calculations, Schedules and Tables Comprising

(a) Schedules of Accommodations, indicating room and space dimensions.
functions, and requirements for Depot, ancillary facilities and property development, if applicable.
Schedules of Finishes, indicating materials and finishes, type and extent for each space.
(c) Schedule of Electrical fixtures, wiring, utilities, plumbing, MEP and control systems
(b) Schedule of signage and provisions for advertisements.

4.8 The DDC's design shall take into account the installation requirements of the system- wide information listed in this Document, which will involve the provision of openings, conduits,

fixtures, bases, plinths and loadings. The DDC shall make provision in its design programme for the inclusion of these requirements at a later date as they cannot be finally determined until after the award of the system-wide contracts. The DDC shall incorporate the requirements of the system-wide contractors into its design as appropriate and as they become available.

4.9 Detailed planning for all civil structures including all structures, systems and processes for identification of all interface requirements relating to their section of works. In addition, general construction methods and documentation needed to develop the Definitive Design shall be submitted.

4.10 The DDC shall review the design all the temporary works like strutting, decking. Support systems for slicing of existing buildings proposed by the contractor during construction phase.

4.11 Sub-soil exploration analysis and interpretation of data and selection of design parameters.

4.12 The DDC shall sub-divide the proposed Definitive Design into Design Packages to be submitted in advance of the Definitive Design Submission and to be identified in the Design Submission Programme. The Design Packages are to relate to the significant and clearly identifiable parts of the proposed Definitive Design and shall address the design requirements as described herein. The Design Packages shall facilitate the review and understanding of the Definitive Design as a whole and shall be produced and submitted in an orderly, sequential and progressive manner.

4.13 Separate Definitive Design submission may be prepared for those major elements to be procured by sub-contract and which sub-contracts include design Where such work is to be procured by the Contractor on the basis of outline design, design briefs and performance specifications, such documents may be submitted as Definitive Design Submissions

4.14 Upon issue of the Notice in respect of the Definitive Design Submission, the DDC shall complete the design in all respects and produce the Construction Reference Drawings. the the drawings governing construction

4.15 The DDC shall incorporate in its design, the relevant seismic criteria and earthquake design, high flood level data (HFL), inundation level of sea etc. pertaining to the region.

4.16 DDC shall prepare Architectural, structural, track alignment & design, Civil structure designs, MEP, Fire protection & suppression & Fire fighting, VAC, and drawings with property coordinated CSDs (Combined services drawings) for submission and review to the Employer. DDC should keep in mind that architectural finishes should govern the MEP and system fixtures and should be designed with utmost care to conceal, hide those services in civil structures and architectural finishes only should prevail in finalisation of scheme and pattern. During definitive design stage all such coordination issues should be resolved and consultant is expected to be providing concealment, routing, trucking solutions for the transport of core system services, based on the experience achieved and lesson learnt from previous projects in a well-structured manner and should adapt and design accordingly real time solutions.

4.17 The general arrangement of the Depot, the Depot machine equipment locations and services routes, and the cable routes are to be shown in the CSD drawings including the existing structures and utilities. The equipment loads, openings and embedded items and other similar interface are also to be shown on these drawings.

4.18 This stage will cover the following documents:

a. Design basis Reports and design standards adopted.

b. Development Design (DD) & General Arrangement Drawings (GAD),

c. Estimate, BOQ, specification Preparation of rate analysis for those items, which are not available in CPWD-SOR, based on market rate quotations with rate analysis. Also preparation of abstract of quantities building wise or package wise, as required by CMRL.

d. Quality assurance and quality control (QA/QC) plan,

e. Reinstatement/ rehabilitation plan,

f. Work programme etc.

g. Structural Design of Structures and Services. (The details/ calculations of Design should be made available to CMRL by the consultant). The consultant shall be responsible to get the designs proof checked from lead design checker, before submitting to the CMRL

h. Preparation of Drawings and Detailed Estimate of all works/ packages for the project

i. Approval/clearance of the Building Plan and Services by Local Statutory Authorities (if required) before start of execution of works.

j. Detailed design, considering load data, Noise and Vibrations of equipment. Tender drawings, cost estimates and specifications to cover all civil works associated with installation of all mechanical/ electrical equipment, services and systems. Consultant will take into account acoustic and ergonomic consideration as per best practices in their design

4.19 Design interfaces with interfacing contractors

The DDC shall interface and incorporate all the relevant information regarding the system-wide works in its design and other documents including but not limited to:

a. Rolling stock and Depot Machinery and Plants;

b. Electrical substations and associated high voltage and traction power supply systems,

c. Electrical underground conduit banks within CMRL right-of-way,

d. ECS systems; Ventilation and Air-conditioning (VAC)

e. E & M, plumbing, Firefighting and fire suppression, Earthing, bonding & corrosion resistance etc.

f. Overhead line electrification.

g. Signalling;

h. Communications including Closed Circuit Television (CCTV), Public Address (PA), PIDS, Clock, SCADA systems, Networking, Access control systems, TETRA and other systems.

i. Traction power, power supply and emergency power supply equipment:

j. Automatic fare collection system:

k. Lifts and escalators.

l. System Signage and Advertising

4.20 Upon award of system wide contracts, based on the requirements of system-wide contractors DDC should modify the designs to attain best-fit and suitable solutions.

4.21 The general arrangement of the Depot, the major equipment locations and major services routes, and the cable routes are to be shown on the CSD drawings along with existing structures and utilities. The major equipment loads, pressure, major openings and major embedded items

and other similar interface are also to be shown on these drawings. During the detailed design phase and continuing through the construction phase the DDC shall co- ordinate with other system-wide contractors to obtain system-wide requirements such as embedded conduits, floor trunking, wall and floor openings, equipment concrete plinths, equipment space, sleeves, hoisting hooks, earthing, lightning arresters etc.. and incorporate into the structural/architectural drawings for construction contracts.

4.22 The layouts of the Depot data of the system wide consultants/contracts shall be co-ordinated at the compatibility review meetings during the design stage. At the final submission stage detailed layouts shall be co-ordinated and drawn by the DDC on full set of CSD drawings with soft copies. These drawings serve to co-ordinate major routings of all services. It directs the system-wide contractors to prepare their respective shop drawings in accordance with the routings shown on them. During design and continuing through the construction phase the DDC shall revise completed or partially completed SEM and SOD drawings and structural/architectural drawings to incorporate the additional system-wide requirements defined by the system-wide CSD's.

4.23 Additional layout details and system-wide requirements requested by systems and MEP Contractors during construction shall be incorporated into the CSD, SEM drawings and structural/architectural drawings. DDC shall make available the CAD/ electronic data to the systems and E&M contractors who will incorporate these additional details in the design. DDC shall review and incorporate the modified design. However, DDC shall repeatedly interface with System Contractors/ other DDCs to ensure compatible complete design of Civil and ancillary structures. The Consultant shall co-ordinate all design and installation work with the various Interfacing Contractors.

CHAPTER 5

FUNCTIONAL DESIGN REQUIREMENTS FOR CIVIL & STRUCTURAL DESIGN AND TRACKS WORKS

5.1 Civil

For preparation of Schedule of Dimensions, Structural Electrical Mechanical & Combined Services Drawings): (Station, Viaduct and Depot Building)

5.1.1 Functional requirement of Civil and Structural Design

The DDC shall perform all civil and structural design within the contractual provisions, including, the preparation of calculations, drawings, specifications, cost estimates and other documents, as required but not limited to:

a) General arrangement drawings;
b) Design Calculations: Calculations relevant to the Definitive Design shall be submitted for assessment with the respective Design Packages or Submissions.
c) The above calculations shall have been certified by the DDC Lead Design checker before submitting to the Employer/ Employer's Representative. The Employer/ Employer's Representative requires the submission of applicable

software including in-house software programmes/ worksheets developed by the DDC, computer input file etc for his assessment prior to the acceptance of the computer output.

d) Soft copies of Design EXCEL spreadsheets and computer model data files sufficient to regenerate the model and re-run the analysis should be submitted together with the calculations to the Employer.

e) The DDC shall submit all calculations necessary to support proposals relating to the construction methods. (Colour copies).

f) Design and drawings of Structural Steel Connection details to be submitted by the DDC for the all permanent and temporary structures. Soft and hard copy of the analysis and design excel sheets to be submitted.

g) Track alignment & Design, Track structure interaction study

h) Detailed and typical sections;

i) Earthwork cross sections;

j) Line side and security fencing;

k) Escalators and Lifts; (Civil, E& M provision)

l) Fire Fighting Arrangements;

m) Drainage plans

n) Ancillary buildings such as: ventilation shafts exhaust shafts, DG rooms, pump house; sub stations; and Security post; chillers, plant rooms etc.

o) Surface drainage plans; roads, parking lots and bus bays in station traffic integration area

Restoration & Reinstatement plans with landscape, road furniture and fixtures reinstatements

p) External Electrical/ Plumbing/ Sewerage/ Water Supply, Fire Fighting Systems, Fibre Optic Connectivity-IT Infrastructure, Communication Networks, Roads, Pathways, Street Lighting, Campus Landscape/ Horticulture, Urban Furniture, Signage, Water (Rain Water harvesting) and Waste Management (STP/ETP) etc. Sustainable Model, Energy Conservation, or any other infra structural facilities as required as part of Master Plan).

q) The DDC shall co-ordinate its design with the relevant agencies and Interfacing contractors to develop their design and drawings.

r) Particular attention shall be paid to locations where flooding could happen. In particular,

   i. Design of surface water drainage systems including plinths and ducts shall be avoided in the vicinity of traction substations to obviate any risk of flooding of electrical equipment areas.

   ii. Equipment rooms and pits for lifts, escalators and other facilities shall be adequately protected against flooding.

5.1.2 Conceptual drawings as applicable.

a) Preliminary planning with tentative production rates

b) Estimation of preliminary quantities per structure type

c) Identification of land acquisition (if required) for temporary and permanent structures

d) Justification of the proposed construction methodology.

5.1.3 Functional requirement of Architectural Design

The DDC shall incorporate and co-ordinate its designs, and prepare drawings and documentation to be incorporated in the following system wide elements drawings which will be used in all stations:

I. Finishes Schedules: Floor Finishes; Wall and Column Finishes; Ceiling Systems and Finishes
II. Railings, Barriers and Gates
III. Stair and Handrail Details:
IV. Escalator Finish Details
V. Lift Finishes Details
VI. Platform, Platform Screen Doors for stations, coping Details
VII. Doors and Frames
VIII. Miscellaneous Public Area Details such as pump house, police post, sub-station etc.
IX. Platform Edge Lighting
X. Public and Staff Toilet Room Details
XI. Staff Room Details
XII. Signage and advertising Details as per signage manual of CMRL.
XIII. Landscaping and External Works
XIV. All finishes required for elevated Viaduct
XV. All finishes required for cut and cover section
XVI. Plans, Sections, Elevations and Details of
    a. Ticket Office
    b. Ticket Hall Supervisor's Office and Excess Fares Collection
    c. Information and Enquiries
    d. Station Control Room
    e. Platform Supervisor's Booth
    f. Other Booth and Office Details
    g. Door and Window Details
    h. Countertop and Casework Details
    i. Station Manager's Room,
    j. Pump Houses, Auxiliary Substation
    k. Provision of Facilities for Physically challenged (including ramps, tactile tile layouts etc.)

The DDC shall review Standard Specifications for architectural standard design elements and for the supply and installation of architectural standard finishes and materials with the consent of Employer/Employer' Representative. Architectural Standard Specifications shall include but not be limited to the following:

a. **Site work:** Granite Kerbs, Concrete Kerbs, Natural Stone Pavers, Brick Pavers, Concrete Block Pavers and Grass-Concrete Pavers.

b. **Concrete:** Concrete Floor Surface Treatments; Precast Concrete Architectural Panels; Glass Reinforced Cement Panels.
c. **Masonry:** Mortar, Grout and accessories for Granite or Other Stone; Mortar Grout and
d. **Accessories** for Paver Tile; Mortar and Grout for Masonry and Exterior Setting Beds; Granite or Other Stone Flooring and Bases; Granite or Other Stone: Cubic and Veneer.
e. **Metals: Vitreous** Enamelled Steel Panels; Barriers and Railings; Drain Grates and Manhole Covers.
f. **Thermal and Moisture Protection**: Sealants
g. **Doors and Windows:** Entrances and Storefronts; Hollow Metal Doors and Frames; Rolling Grilles; Glass and Glazing.
h. **Finishes: Paver** Tile; Wall Tile; Metal Ceilings;
i. **Specialities:** Toilet Partitions and Accessories; Equipment Cabinets; Graphics and Signage; Ashtray and Litter Bins; Telephone Enclosures; Booths and Workstations.
j. **Mechanical Work:** Plumbing Fixtures.
k. **Electrical:** Lighting, power.
l. **Landscape:** Landscape Soft works.

The DDC shall ensure that the Natural lighting shall be harnessed to the maximum extent.

The DDC shall provide continuing support in the form of design data, design calculations, CAD files, and perspective sketches, 3D computer model renderings of each typical station and the like as requested, whether for promotion, approval or other illustrative purposes for Employer/Employer' Representative. DDC will provide technical assistance and drawings for Employer/Employer' Representative as and when required.

5.1.4 Functional requirement of Green Building design & Certification

For CMRL Phase-1, including the extension corridors, all metro stations have already received "Platinum" level certification under the IGBC Metro Rail Rating System. The Detailed Design Consultant (DDC) shall ensure that all designs and related works maintain this certification level. This includes the use of eco-friendly materials, water and energy conservation, air quality improvement, and support for green building practices. The DDC must submit station-wise compliance reports. All proposed materials and methods shall be shared with CMRL for review prior to finalization of tender documents.

5.1.5 Functional requirement of Landscaping Works:

Landscape architecture, site planning, suitability & appraisal, landform including preparation of detailed design & drawings of landscaping elements, open space design, plant structure, illumination design, street furniture and graphic design and signage.

The services shall include:

i. Site appraisal and suitability
ii. Site planning
iii. Landform and Grading
iv. Surface drainage design and storm water management

v. Irrigation design
vi. Open Space design- Hard and soft scape / areas
vii. Planting design
viii. Landscape structures and features
ix. Landscaping elements/ parapets/ swale etc.
x. Garden furniture design
xi. Illumination design
xii. Graphic design and signage
xiii. Co-ordination of external services.
xiv. Inspection and validation of works at site

5.1.6 The key aspects covered by the DDC will be:

i. Reference standards;
ii. Design Basis Report
iii. Design Criteria;
iv. Interpretation of the geotechnical and hydrogeological investigations;
v. Identification of the initial geological, geotechnical and construction risks and quantification of the mitigation measures and contingency measures during construction to reduce the residual risks;
vi. Construction method and construction sequence;
vii. Applied load cases and design assumptions;
viii. methods of analysis, which have to be appropriate and valid;
ix. Geotechnical and Structural design of permanent works;
x. ultimate and service design capacities of all components;
xi. Fabrication drawings shall be prepared by the Contractor; Checking of Fabrication Drawing is in the scope of work.
xii. Proof checking of temporary works (including scaffolding, shuttering details etc.) to facilitate the construction of permanent works.
xiii. overall stability of the structures in both the short and long term conditions;
xiv. water tightness requirements and proposed technical solutions;
xv. construction and reinforcement details;
xvi. design of the mitigation measures;
xvii. suitability of the design to the construction methodology adopted by the Contractor;
xviii. Integrity of structural member and structures as a whole;
xix. constructability;
xx. Interface drawings civil works / M&E equipment.
xxi. The scope of DDC covers the design of all the structural component of station building and its ancillary components including entries, exits, connecting corridors/FOBs etc.
xxii. Design of structural works for architectural finishing, Interfaces and functional requirements such as design of louvers, ACP, cladding, structural glazing, counters, GRC jali, etc. will also be considered

5.2 Track works

The Scope of Services consists of preparation and submission of the following design calculations, documents and drawings duly following relevant standards.

1. Detailed Design of Track Alignment:

- Detailed geometric alignment as a plan and profile drawings for the proposed lines and Modified tracks as per requirement.
- Review of alignment w.r.t SOD & clearance & suggest modifications/improvements.

2. Ballast less Track Design:

   - Submission of (DBR & DCN) for Track slab and Turnout slab and special tracks including inspection bay, pit track, washing track, access tracks and transition slab. Etc.,,
   - Submission of Preliminary and detailed design drawings.
   - Interfacing with other systems engineers for a holistic design approach

3. Cost Estimation and Preparation of Tender Documents

   - Finalization of Estimates and Tender documents
   - Preparation of Addendums
   - Participating in Pre-bid meetings
   - Tender Evaluation and Finalization of Tenders

4. Regarding Track Accessories, the followings shall be submitted:

   - Acceptable tolerances.
   - Review of supplier design documents.
   - Requirements for earthing, bonding and corrosion protection.
   - CWR- International codes will be followed for designing

5. Regarding Construction drawings, the followings shall be submitted in stages:

   - Conceptual Drawing
   - Preliminary Drawings for approval
   - Construction Reference Drawings
   - Good for Construction Drawings
   - Validation of the shop drawings

6. Attending Interface and site meetings

7. All designs and drawings produced in the scope of works shall be proof checked by suitable qualified person(s) who will act as lead design checker (LDC). The quoted fees are inclusive of the LDC fees.

8. Review of As-built drawings and Compiling As – Built drawings for new and old tracks.

CHAPTER 6:

(FUNCTIONAL DESIGN REQUIREMENTS FOR ARCHITECTURAL DESIGN. ELEVATION STATION)
DELETED

CHAPTER 7

FUNCTIONAL REQUIREMENT OF E & M & PLUMBING WORKS

7.1 Functional requirement of E & M. Plumbing Works

The MEP (E&M) services shall include the detailed design of all building facilities within the Koyambedu Depot facility enhancement and stations for 6 car operations, as per the recommendations provided in the DPR, ensuring seamless integration with architectural interfaces and MEP (E&M) services within the civil structures. Prior to this, the DDC shall study the existing facilities in the Koyambedu Depot and stations and prepare reports accordingly. This shall include the incorporation of architectural co-ordination requirements with the requirements of other disciplines for the following services for the 6 car operations:

1. Provision for lifts & escalators:
2. MEP E&M support provisions:
3. Low voltage distribution.
4. Normal lighting:
5. Emergency lighting connected to ups backed by DG set and normal supply,
6. Essential lighting backed by DG set supply,
7. General purpose power,
8. Signage.
9. Uninterruptible power supply system (UPS) for lighting loads:
10. Fire Prevention, Fire detection, Fire protection, Fire suppression for passenger amenities/ commercial development as per latest NFPA 130 guidelines/ NBC code & local fire authorities: Fire Compartmentation drawings.
11. Smoke Management report for all structures.
12. Water services; pumps and automatic control.

13 Drainage, plumbing and sewerage.

14. Lifting equipment at plant rooms.
15. Lighting calculations, Lighting power distribution for parking areas circulation area station face lighting.

16. Provision of cable ducts, cable ways or trenches for all the cables including in coming 33kv supply cable or cables supplied by any interfacing contractors.
17. LT distribution and fire prevention measures for passenger amenities/commercial development advertisements inside station.
18. Building Management system
19. VAC requirements
20. Lighting calculations for different buildings, civil structures, stations, viaduct, out and cover ramp etc. as applicable
21. PABX system (Telecom) and other Telecom Systems like LAN/MAN Network, CCTV, PA, PIDS and TETRA,
22. Electrical & communication cable layout drawings.
23. Typical installation drawings
24. Conduit layout drawings,
25. Mode tables and other required logics for automation.
26. Mounting details of lighting fixtures and other fittings,
27. Load calculations for internal electrification, DB/ SDB details of different circuits for lighting fixtures, fans, exhaust fans, sockets, HVAC etc.
28. Cable sizing details, cable schedule.
29. Details of protection switch gear, calculation of breaking capacity of upstream tripping, assessment of requirement of residual current circuit breaker and other special requirement of switch gear for scientific equipment along with specific requirement of zero halogen fire retardant and flame proof cables and switchgear.
30. Power generation through solar panels and use of energy efficient fixtures
31. External Electrification: Design of electrical distribution system and recommendation of capacity of electrical substation, tapping points for pumps, systems, MEP systems etc, Layout of cable, feeder pillars, street lighting system etc. complete in all respects
32. Any other requirements as applicable to comply with applicable norms of concerned authorities
33. All individual components should be readily accessible for maintenance and repair
34. The power supply to essential and 'semi-essential services shall be backed by a DG set and the power supply to emergency services shall be backed up by UPS.
35. Load estimation and optimization, design of system/ equipment, selection, description, preparation of technical specifications, supporting, calculations,

BOQ, drawings, SLD, schematics, blank data sheets of recommended vendors list, rate analysis (with back up offers). cost estimates, obtaining clearances and certificates from statutory authorities wherever required.

36. Earthing and Bonding systems

7.2 Low voltage (LVSGR, Low side equipment) Requirement :

Design report, Low voltage power balance calculation note, Main switch board schematic diagram. Lighting schematic diagram, Earthing and bonding system schematic diagrams, Preliminary BOQ and equipment schedule, Typical Installation Drawings, Calculation notes for low voltage (station electrical loads, short circuit, cables, lighting, Lighting control system SCADA system Lightning protection Schematic diagrams, Main switch board schematic diagram, Distribution boards schematic diagrams.

7.3 E&M services the DDC shall prepare :

a. Design Drawings (Preliminary & Definitive design);

b. Tender Drawings for Electrical and Mechanical Works (E&M), BOQ, Estimate/Rate Analysis, Material and Workmanship Specifications, Special Conditions of Contract, Instruction to Bidder and Building Management System (BMS/ SCADA)

c. Layout of the Plant Rooms,

d. Ducting & Piping Layout,

e. Design of Lighting for entire Station, Entry/Exit structures, etc.

f. Designing, Sizing and Layout of Earthing and Lightning Protection System (excluding preparation of Drawings and Layout)

g. Sizing of DG Sets, UPS, Cables and selection of Frame Size of Breakers.

h. Review of Contractor's shop Drawings for E&M only.

i. Preparation of CRD's which is to be approved by CMRL

j. Finalisation of Electrical Load Schedules after interfacing with other Departments of CMRL/System Group, Other designers/Contractors,

k. Lighting System Design in Station, Entry Structure and Service areas, Road and MMI area near station entries and totems etc.

l. Small Power Layout (Socket/Lighting DB's),

m. Cable/Wire containment system (trays, ladders, conduit etc.),

n. Hydraulics / drainage system design and layout (including pipe work, drains, sump etc.), Water supply and Drainage arrangement for entire station and ancillary building.

o. Fire Detection and Suppression System design and layout,

p. General arrangements and layout Drawings for Panels, Switchboards, DG sets, UPS and other necessary equipment etc.

q. VESDA system, Aspiration smoke detection system

r. The DDC shall prepare Testing, Commissioning and acceptance Criterion.

s. Prepare Documents in the form of Data sheet and relevant Calculations.

t. Determination of Quantities and Preparation of BOQ, etc.

u. Modify, update and supplement as necessary, the CMRL's Outline Design Criteria / General / Material and Workmanship Specifications as provided to suit the present work.

v. Co-ordinate and integrate designs and details with other Contractors and Consultants employed by CMRL working on contracts pertaining/relevant to the site of works for this contract including interface with Design and Construction activities of Station and Viaduct.

w. DDC shall interface with other System Contractors for Preparation of Combined Services Drawings (CSDs), Structural Electrical and Mechanical Drawings (SEMS) as defined elsewhere in the Agreement. DDC shall Prepare Tender Drawings, Construction Reference drawings for the scope of work and also prepare CSD and SEM Drawings showing all openings for E & M 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.

x. Prepare comprehensive cost estimate for the works and CAMC Comprehensive Annual Maintenance Cost) estimate with Bill of Quantities (BOQs) for E & M Contracts separately for tendering by CMRL, if required.

y. Prepare necessary Technical Documentation, Presentation and assist CMRL to obtain necessary approvals for E&M Systems including Fire Detection Suppression System from the Approving/ Statutory Authorities such as Fire Service. (TNFRS).

z. Plan, Design, Detail, Control, Co-Ordinate, and Execute the design phase of the Works for Production of Drawings, Calculations, Documents and Reports to meet the Key Schedule Dates included in the Agreement and as directed by the CMRL.

aa. DDC shall be available for any clarification to the intending bidders, either through a pre bid conference organised by the client or otherwise, on the Drawings/ Designs/ Schedule of Items prepared by them.

bb. DDC shall verify Bill of Quantities of each Schedule before issuance of Tender METRO Documents and also confirm to CMRL that all items of works have been incorporated in the BOQ documents.

cc. Designing, Sizing of Cable Containment of various systems like: Signalling, Telecom, AFC, E&M, , VAC, PS, OHE, Lift & Escalators, Rolling Stock, etc.,

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dd. Confirmation of Power supply requirements with Systems like: Signalling, Telecom, AFC, E&M, , VAC, PS, OHE, Lift & Escalators, Rolling Stock, etc.,

ee. Any Earth bonding to be considered with reference to Civil, Structural, and scope of the contractor shall be clearly defined.

ff. Necessary shore supply to be ensured for the 6 Car operation.

Further, the scope of design of ELECTRICAL & MECHANICAL SERVICES shall Include the followings but not limited to

- 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 Duct/Trucking/Feeder Cables as required
- Design of Power factor & Harmonics study for both HV & LV side Power Network
- Design of UPS feeding all Emergency loads / Critical loads.
- Design of DG sets for feeding all Emergency / Critical, 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 & low voltage side protections and protection of the individual equipment.
- Design of normal and emergency lighting arrangement & lighting control system automatic operation in Station areas, cable galleries, parking areas, sub way connecting entry/exit and other room. This includes external cabling and provision of lighting fixtures with lamps, ballast, control gear, Weatherproof junction boxes, connectors, etc.
- Design of Control and small power supplies to various station equipment/ Panel if required.
- Design of Lightning Protection System

The scope of design of FIRE DETECTION AND SUPPRESSION SERVICES shall include the followings but not limited to

- Design of complete Fire- Detection & Alarm system including monitoring and control through a Fire Alarm Panel.
- Designs of Fire suppression system in stations and Ancillary Building / other structures including Hydrants, Hose Reels, Sprinklers System, Fire Hose Cabinets, Fire Mains, Portable Extinguishers, Gas Based Flooding System, pipe line network with control valves for sprinklers and hydrants.

7.4 Functional requirement of Lifts/Escalators

a) Design of plant rooms, plinths, supports, anchors, delivery routes, system cable containment, power supplies, drainage connections and other provisions necessary for the installation of the lifts and escalators, and associated systems, by the Interfacing Contractor(s)

b) Preparation of layout drawings indicating the location of lifts, shaft, pit, machine room & floor levels

7.5 Functional requirement of Mechanical & Plumbing works:

Design and preparation of system/equipment description, technical specifications, BOQ, General Arrangement & Layout drawings, data sheets and calculation ensuring compliance with the latest IS codes/standards/NBC norms etc. as applicable, including the following works:

7.6 Plumbing works (Water supply and sewage disposal)

a) Plumbing works shall include all of the work associated with the design of piping, fixtures and appliances in connection with drinking water supply, non-drinking water supply and drainage systems, which flow in and out of buildings and between given connection points to points of use and/or disposal.

b) Water pump installations shall be designed for unmanned operation, controlled through liquid level controllers, capable of pumping the requisite amount of water to the utility or to the ground/ overhead tanks/ underground tanks.

c) The pumping installation shall withstand the corrosive effects of normal water supply, seepage water and sewage and serve for the anticipated life of the equipment.

Drinking water supplies or non-drinking water supplies:

Design and designate the installation, of any pipes, fittings, appliances or other items that directly or indirectly involve the supply of drinking water and non-drinking water, including fire services from a given connection point, or onsite supply source to a point of use within a property.

Sanitary disposal system:

Design and designate for the installation of any drains, fittings, Pipes, fixtures, appliances or other items involved in the collection, conveyance disposal of treatment of sewage, trade waste or grey-water that is above ground.

Drainage :

Design and designate the installation of any below ground drains, pipes, fittings, appliances or other item involved in the collection, conveyance, disposal or reuse of sewage. Trade waste or storm-water that is underground. Inspection pits and inspection chambers.

Roof drainage systems, design and designate roof gutters, flashings, piping, sheeting, roof covering or other above ground items involved in the collection, conveyance, disposal, treatment, storage or reuse of rainwater

Mechanical services:

Design and designate the installation of any valves, regulators, registers, pipes, ducts, flues, tanks, heating and cooling lines or surfaces, cooling towers, boilers, burners. solid fuel heaters, coils or other items involved in heating, cooling or ventilating a building by mechanical means

Plumbing Fixtures

The Plumbing Engineer coordinates the appropriate type of fixtures in the different areas of the building. Close coordination is required for code requirements, number and placement of the plumbing fixtures. Looking at the domestic water system and sewer system with the whole building approach the Plumbing Engineer realizes that low flow fixtures reduce water and sewer consumption. In a municipal system, reducing the amount of municipal sewer and domestic water taken from and placed into the local fresh water supply, depends on more buildings using a water conservation approach to water supply and disposal

Sanitary Sewer Systems-Water flowing from plumbing fixtures collects in the building sewer system. The Plumbing Engineer designs this system to a point it connects to a municipal sewer system or to an on-site disposal or containment system. Some facilities require a separation between waste streams and/or treatment of special waste systems before they enter a common building waste system. For example, the grease waste from a kitchen can damage the sewer piping system. As a result, a grease trap is installed to capture the grease before it enters the common building system.

Storm Water Systems During the rain or storm event rain water falls on building roofs. The water from the rain is collected in the storm water system. Options on methods to handle storm water should be discussed early in the design process and the same should be suitably addressed.

7.8 Ventilation and Air-conditioning systems

a) The objective of the Air conditioning system shall provide a comfortable environment to staffs and equipment in the air conditioning rooms during normal mode of operation.

b) Ventilation shall be provided considering the following

i. Supplying fresh air for the physiological needs of staffs.

ii. Removing body heat, obnoxious odours and harmful gases like carbon dioxide exhaled during breathing.

iii. Preventing concentration of moisture generated by body sweat.

iv. Removing heat generation load from the equipment in ventilation rooms

c) During fire/emergency mode, VAC system shall interface with the fire protection system for shut down of the appropriate VAC equipment.

d) Electrical power supply and distribution system from MDB/EMDB to all VAC equipment's shall be provided. Energy meters shall be considered in all panels.

e) Central Controller

i. Central Controller with the touch screen display shall be provided in order monitor and control the VRF units.

ii. It should facilitate emergency stop function in case of fire or emergency. condition. It shall have individual and group control facility for all indoor units, schedule functions, Interlocking functions and Reporting E-mail facility feature

iii. The address of the indoor unit shall be set automatically in case of individual and group control. Self-demand control and equal run hour option shall be considered in VRF central controller.

iv. It shall memorize the latest malfunction code for easy maintenance

f) External or inbuilt energy / power monitoring device shall be considered for the following

i. Accumulated/current power consumption of each indoor unit in KWH.

ii. Accumulated total power consumption of outdoor and indoor unit in KWH

iii. Necessary Energy / KWH meters along with the signal/ communication cables and power cables for all VRF units shall be considered.

g) Harmonics level of VAC system shall be maintained with acceptable level as per latest edition of IEEE 519 (Recommended practice and requirements for harmonic control in electric power systems).

h) **Design Software tools:** Rivet and HAP (Hourly analysis program) with latest edition. Licence shall be provided in the name of CMRL

i) **Design Criteria for Air Conditioning and Ventilation System**

i. Outside ambient Conditions

ii. It shall be based upon ASHRAE recommended design conditions for 1% criteria Summer : 37.2 °C Dry Bulb Temperature (DBT), 25.8 °C Wet Bulb Temperature (WBT)

iii. Monsoon : 323 °C Dry Bulb Temperature (DBT), 28 °C Wet Bulb Temperature (WBT)

iv. Inside Design Conditions 24 (1) °C Dry Bulb Temperature (DBT) and RH not exceeding 60% (50+/-10)%

v. Minimum fresh air requirements and lighting load shall be taken into consideration as per standard

vi. Occupant load, equipment heat generation load and heat transfer through the wall/floor/window shall be coordinated during design

vii. Working and standby arrangement shall be considered for outdoor and indoor units. VRF indoor units shall be provided with panel type filter with minimum EU-4 rating as per EN 779, Room remote control/thermostat will be located at suitable positions in the air-conditioned rooms to monitor the room temperature.

viii. Refrigerant leak detection system and extraction system shall be considered.

ix. VRV/VRF outdoor unit shall be considered with fully inverter type Scroll compressor with high efficiency COP models.

x. All air conditioned rooms will be maintained at positive pressure with respect to surrounding environment.

xi. Ventilation shall be provided for the ASS (Auxiliary substation rooms, toilet rooms, Janitor room, pump room etc, based on the architectural drawings. Natural ventilation supply shall be considered for all ventilation rooms.

xii. ACPH shall be selected for the ventilation rooms as per NBC latest edition.

xiii. Electrical/ASS rooms and pump room: Two speed motors shall be considered for the ventilation fans. Temperature based controlled ventilation system shall be considered for the energy conservation. Ventilation flow rate shall be calculated based on ACPH and heat generation load method also. Finally, the fan capacity shall be selected whichever is higher.

xiv. Dedicated duct and ventilation exhaust fan shall be provided for the UPS battery room. This fan will be interlinked with Hydrogen gas sensor to maintain the allowable limits of hydrogen gas concentration.

j) Ductwork:

Duct velocity: 10.2 m/s (Maximum) for main ducts
Frictional pressure drop 0.81 Pa/Meter for all ducts.

k) Ventilation Shaft Louver Design Criteria:

Maximum Face velocity in Intake Louver: 2 mis
Maximum Face velocity in exhaust Louver. 2.5 ms

l) Smoke Zoning & Fire Compartmentation:

Smoke zoning and fire compartmentation shall be coordinated with civil architects per architectural drawing Fire damper (FD)/MSD/MFSD shall be provided in VAC wing based on smoke zoning and fire compartmentation drawings

m) Energy Efficiency Measures

DDC shall propose the energy efficiency measures and to get the IGBC platinum rating Crite considering the latest technology as per IGBC (MRTSY ASHRAE 90.1-2010/ECBC-2007 etc.

The maximum allowed noise / sound pressure levels apply to every position within a room height of 1.5 m from the floor and not closer than 1.5 m from any air outlet or equipment. For all fans, acoustic & Vibration calculations analysis to demonstrate that the sound pressure level does not exceed the noise criteria specified in performance requirement

Table 1: Noise Criteria

S.No	Location	Maximum sound pressure level
1	Air conditioning rooms	55 dBA
2	VRF outdoor unit area	65 dBA
4	ASS/electrical rooms and fire pump room	75 dBA
5	All other ventilation rooms	60 dBA

n) The design criteria and other details provided here for preliminary reference only. Hence, DDC shall propose the design criteria and other details based on the relevant standard requirement and experience gained from other metro stations to design complete stations air conditioning and Ventilation system. In addition, DDC to liaise with Civil/Architect and other system teams to get the accurate details to complete the design

k. DDC shall engage independent design checker to verify, validate and certify the design requirements:

i. Submission during preliminary and detailed design stage
ii. Preparation of detailed
iii. Deign program and the same shall be updated at monthly intervals.
iv. Design basis report including VAC schematic drawings for Air side and VRF refrigerant system, Electrical SLD, Control and monitoring architecture shall be submitted in an acceptable manner to the employer.
v. DDC shall submit the power, control/signal wiring diagram incorporating VRF units Power distribution device and central controller. Control logic write up starting staging and shutdown sequence shall be included.
vi. Air conditioning system/Heat load calculation for summer and monsoon.
vii. Refrigerant pipe sizing shall be submitted from the OEM software tool
viii. Ventilation system calculation
ix. Fan total pressure drop and sound attenuator calculation
x. Design of Electrical system for VAC works including panels and cables etc. Calculations related to Electrical system shall be submitted including electrical load schedule. Layout for Cable/Wire containment system (trays, ladders, conduit etc.),
xi. The relevant calculations including soft copies of software/spread sheets to the design shall be submitted for the review with respective design submissions
xii. Equipment schedule for air conditioning and ventilation system.
xiii. Interfacing documents with civil and other system.
xiv. VAC system preliminary and detailed design layout drawings including ducting, piping and cable tray layouts which includes support drawings. Layout for each level showing the location of each equipment/components of the system.

xv. Optimised design considering maximize natural ventilation provisions should be studied and submitted.

xvi. Equipment sizing and optimisation of VRF outdoor unit area

xvii. DDC shall prepare material technical specification for VAC material and equipment.

xviii. Preparation of Method statement for installation, testing and commissioning. Acceptance criteria shall be included.

xix. CSD and RCP drawings: Sequence of all activities shall be included by DDC in order to avoid clash with other systems. Detailed combined services drawings (CSDs) and provide structural electrical/Mechanical drawings (SEM) shall be submitted showing all openings for VAC system. Any other buildings services as directed by Employer.

xx. Preparation for Good for construction drawing

xxi. Testing, Adjusting & Balancing: DDC shall consider the requirements of NEBB (National Environmental Balancing Bureau) and ASHRAE standard during the detailed design for optimal performance of VAC system

xxii. Preparation of tender documents and drawings.

7.9 Earthing and Bonding

Purpose of Earthing and Bonding

i. The purpose of this Earthing, Bonding is to define the requirements for the earthing and bonding of the E&M System

ii. the safety of operating personnel and other persons from electrical shock.

iii. the minimum of electrical interference between the electrical power supply and other electrical and electronic systems and the protection of electrical equipment.

iv. the minimum of disturbance to existing statutory services and parts of the Metro system due to any electrolytic corrosion effects arising from AC traction currents flowing to and from the general mass of earth.

v. The Contractor shall coordinate his designs for earthing, Bonding as required with all Other Contractors.

vi. Reference in other documents to "Grounding" shall be taken to be synonymous with 'Earthing".

CHAPTER 8

(Design of Ventilation and Air-conditioning systems)

Deleted

CHAPTER 9:

(TVS)

Deleted

CHAPTER 10

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS CONSTRUCTION REFERENCE DRAWINGS

10.1 Based on definitive design documents the DDC shall prepare and submit for approval to Employer, the complete documents consisting of detailed designs and construction drawings, BOQ and detailed specification, setting forth in detail the work required for the architectural, structural, MEPVAC, Tracks ,Civil works etc.

10.2 The DDC shall prepare and submit for approval to Employer technical specifications describing type and quality of materials finish, manner of be constructed construction and general conditions under which the project to be constructed.

10.3 The DDC shall assist the Employer in filing the required documents to secure approval of government authorities having jurisdiction over all aspects of the project including design, stability, safety, durability and energy efficiency.

10.4 The Construction Reference Drawings shall be derived directly from the Definitive Design and shall detail and illustrate in full the Permanent Works. The Construction Reference Drawings issued as Good for Construction drawings to the contractor shall form part of the Working Drawings to be used for construction purposes.

10.5 Plan, design, detail, control, co-ordinate and execute the design phase of the Works for production of drawings, documents and reports. Cost effective and construction friendly detailed structural design drawings of all required components and preparation of Construction reference drawings (CRD)/Good-for-Construction (GFC) drawings which shall include review of Bar bending schedule

10.6 CRD drawings includes "Design drawings" means all drawings except shop drawings and as-built drawings

COORDINATION DRAWINGS

10.7 Combined Services Drawings (CSD) means those drawings , showing the locations, sizes and details of all of the System wide 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

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and to enable future changes or modifications to be performed without impacting the existing installation.

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

10.9 Combined Services Drawing (CSD), Structural Opening Drawings (SOD), Structural-Electrical-Mechanical (SEM) should be prepared and submitted for approval to and updating them during construction.

10.10 Incorporate design changes and co-ordinate with system-wide/interfacing contractors.

10.11 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 Consultant.

10.12 The Consultant will provide and issue detailed Interface Drawings in terms of items such as, special arrangements, space allocation, cast-in items , Primary and secondary fixings, grouting of equipment/plinth drill and fix brackets, embedded and cast in items and the like.

10.13 The drawings shall be prepared by the Consultant and 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

10.14 Combined Services Drawing (CSDs) And Structural E&M Drawings (SEMS)

The Consultant's CSDs and SEMs 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 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 Employer for a notice of no objection.

10.15 The CSDs 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 CSDs 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.

10.16 The SEMs 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

10.17 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 Consultant from these Interfacing Contractors indicating the builder's work to be incorporated into the Works. The Consultant shall include details of such Builder's works in the SEMs and propose Method Statements as appropriate.

10.18 Builder's work comprises, but is not limited to, the following:

a. Design of plinths, bases, builder's 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;
g. all in accordance with the Contract

10.19 The CSD/SEMs shall also be used for the purpose of co-ordinating with the METRO 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 Employer.

10.20 Where the CSDs or SEMs do not fully co-ordinate with the site conditions the Consultant shall co-ordinate and propose a solution to the problem without no cost the Employer. All proposed solutions shall be issued to the Employer for Notice of No Objection (NONO).

10.21 The Contractor shall note that the information exchange is an iterative process requiring the exchange and updating of information at the earliest opportunity and shall be carried out on a regular and progressive basis so that the process is completed for each design stage by the cut off dates. Any claims of additional costs by the Interfacing Contractors as a result of the Consultant's failure to incorporate and update design & drawings shall be borne by the Consultant. No time and cost implications will be paid to the consultant in this regard for delay in incorporating inputs of interfacing contractors.

10.22 The consultant should also interface with adjacent and adjoining consultants, contractor and interfacing contractors to develop and fine tune the work. The detail of the subject alignment for which the DDC is appointed is provided in scope of the works.

CHAPTER 11

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS: PROCUREMENT OF CONTRACTS

Tendering and procurement of contracts

11.1 Construction Programmes and contract packaging

The DDC shall submit for approval to Employer, proposed construction programmes based upon its methods of construction and work sequences. The programme shall include interface activities with system-wide and other contractors and operational dates. The programmes shall be submitted to the Employer for review The DDC construction implementation schedule demonstrating that the design can be constructed within the schedule guidelines of the Contract Documents and indicate the earliest available dates for completion of the Works. This shall include significant schedule milestone events (i.e. track bed releases, technical room availability, etc.) based on logical restraints, reasonable resources, achievable production rates, and solid construction practices.

The contract packaging will be provided by the Employer separately for different portions of works and also different system disciplines (Civil, Architectural, Tracks, MEP, VACetc.) for various sections of alignment. The Tender documents, specifications, GFC drawings and cost estimates should be done separately for each package.

11.2 Construction Cost Estimates

The DDC shall prepare and submit for approval to Employer in preparation of, the construction cost estimate for depot.. These estimates shall be based on the schedule of rates (SOR) southern railways/ CPWD(SOR)/TNPWD SOR/DSR/ Metro water SOR/ TNEB SOR/ existing rates available in CMRL/market rate (if rate not available). If there are any points of disagreement or inconsistency/omissions in the estimate, all modifications of the cost estimate before contract award shall be in the DDC's Scope of Service.

The estimates shall show the unit rates and quantities adopted and shall give details where required of how the unit rates were developed. The estimates shall be broken down into separately identifiable sections of Works. The DDC shall input cost estimate data in soft & hard copies.

Any deviation in quantity of items also required to be supported by rate analysis. Also preparation of abstract of quantities building wise or package wise, as required, obtaining clearances from statutory authorities, wherever applicable, any other information required to be included to complete the specifications for all works.

Confidentiality of Estimates and Design Budgets

All estimates shall be treated as strictly confidential and shall be submitted by the DDC in sealed envelopes separately from other documents that it is required to provide. Any malpractices and leakage of confidential information of any nature will be view seriously.

11.3 Tender Documents

DDC should assist the Employer in packaging of contracts for the best value of money bidding, and prepare necessary inputs for preparing Tender documents it is to be noted that separate tender package for civil MEP, , Tracks, VAC etc have to be prepared. Consultant needs to prepare necessary technical documents for tendering including BOQ detailed specifications, cost estimates and incorporate corrections as and when necessary before the contract in awarded. The BOOs, specifications, cost estimate are to be prepared for Depot. so as to enable Employer to call tenders in different contract packages

DDC will prepare the final draft in soft copy & hard copy including BOQ Tender drawings Technical specifications, tender schedules & forms, SCC etc and send for review to Employer for preparing and uploading of tender documents. The Consultant's contract team should be present in CMRL as and when required for smooth lesioning with CMRL officials for floating of tenders.

The Consultant shall participate and furnish technical explanations and clarifications to the Tenderers on specific queries of the Tenderers during the pre-Tender meeting. The minutes of the pre-Tender meeting and addendum/corrigendum, if any, are to be prepared by the Consultant.
The consultant should perform with profound confidentiality and trust with the employer. They are prohibited to disclose any information whatsoever without consent from CMRL. The Consultant shall not enter into discussions with the Tenderers on any matter concerning the rates/prices to be quoted by the Tenderers.

CHAPTER 12

SERVICES TO BE PERFORMED BY THE DDC DURING AND POST-CONSTRUCTION PHASE:

12.1 GOOD FOR CONSTRUCTION DRAWINGS

Construction Reference Drawings (CRDs) submitted to Employer prior to award of work shall be updated to Good-for-Construction drawings (GFCs) incorporating changes (if any). Where changes to the contract drawings are required on account of site constraints, coordination and interface requirements, the DDC shall be responsible for preparing all data related to the detailed design onto drawings to be issued to the Contractor. . Any design modification during construction shall be provided by DDC.

The Consultant shall endorse the submissions required under the Contract that "all effects of the design comprising the submission on the design of adjacent or other parts of the works have been fully taken into account in the design of these parts."
The GFC drawings for alignment, architectural, structural, GADs, CSDs, tracks, MEP, etc. should be issued separately for each contract packages with latest revisions.

DDC shall issue design modifications of the existing drawings (within 7 days upon request Employer) and supply a new/supplementary drawing duly approved by the proof- checker/ Lead design checker, wherever required and give instructions thereof to the contractor

DDC shall provide design support during the construction to review the work for compliance with the design and to carry out design changes required during construction. Review and endorse working drawings/Shop/fabrication drawings and other Temporary structure design and drawings submitted by the contractor with LDC to the DDC for approval drawings submitted by the contractor and report changes including analysis to assess if there is any adverse impact of such changes.

Working drawings/ Shop drawings prepared by the contractor shall be endorsed/ approved by the Consultant as being in accordance with the Construction Reference Drawings/Good for construction drawings.

12.2 Construction Methods and Temporary Works

The DDC shall review, update and issue the revised drawings based on material samples, mock-ups of Civil, Architectural finishes items of the construction contractor without any cost implications. Further more the DDC shall assess, and report to the Employer the construction contractor's proposed construction methods and temporary works design with respect to their effect on the permanent works and give their views to improve the method etc. submitted by the contractor.

12.3 Site Visits of Construction Sites:

12.4 The DDC shall visit the site to provide his expert opinion on the design related issues of the Works and to report to Employer , their observations and issue the revised drawings if required with necessary modifications and certificates. **Site Meetings**

DDC shall attend site meetings as and when required by the Employer ,during the design stage and construction phase

12.5 Monthly Progress Meetings

The DDC will attend monthly progress meetings and required to produce

a. 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,
b. An updated copy of the progress registers showing the titles and status of all drawings and documents (with drawing index sheet as per Performa agreed by Employer)

12.6 As-Built Drawings of the Works

"As-Built Drawings": means those drawings produced by the Contractor and endorsed by it as true records of construction of the Permanent Works

a. DDC shall review as-built drawings submitted by the contractors with respect to CRD/GFC/ Latest design Modifications on a continuous basis prior to the issuance of the Certificate of Completion by Employer/Employer Representative for the construction contract

b. While reviewing the as-built drawings prepared by contractor and where there is deviation from CRD/GFC drawings prepared by DDC, the DDC shall check the integrity of the structure and suggest any remedial measures (if required).
c. DDC is responsible to coordinate submission of As-built drawing by the contractor(s) and submit the same to CMRL duly verifying the submissions till the Assignment period.

12.7 Maintenance report

A report completes with statements of Maintainability and asset inventory detailing maintenance routines necessary for the achievement of the required design lives of the various elements of the works and other data considered necessary for effective maintenance of the system shall be submitted by the DDC to enable issuance of Taking over certificate (TOC) to the works contractors. DDC shall be solely responsible for the analysis and interpretation of all the data received and collected and for the conclusions and recommendations contained in their report.

12.8 The Reports and Documents

The Scope of works describe the reports and documents to be submitted by the Consultant, as well as the frequency of submission, number of copies and requirements to electronic submission ( ). The reports can include

a. Inception report
b. Design Basis Report
c. Special survey or study reports

The Consultant shall submit for approval by Employer/ Employer's Representative, a detailed programme for completion of each of the activities for which the Consultant responsible. The programme shall be prepared with 3 weeks Look Ahead programme and is to be updated continuously using the software (PRIMEVERA Latest Version)

12.9 Reports during Construction Phase

During the construction phase of the Project, the Consultant shall prepare and submit the following reports in hard and soft copies in the format approved by the Client the format of reports shall be prepared by the Consultant and submitted to CMRL for approval in advance.

Particulars of the Report	**No. of Coples**
Monthly Progress Reports	3
Final Completion Report with CD	3

12.10 Monthly Reports

The Consultant will, no later than the 5th of each month, should submit proof checker/ Lead design checker's monthly report summarizing the status of all the designs including design modifications/ field changes etc. to the Employer/ Employer's Representative covering the status of all the design checked during the preceding month. The report will also outline any

design related technical problems encountered during construction. rectification and repair works methodology related to structures, consultant's minutes of meetings (site, interface, etc.) and consultant's recommendations on how these problems may be overcome.

12.11 The Consultant shall also review design related aspects if any pertaining to the following reports submitted by the contractor:

1. Construction Method statements
2. Construction sequence and Supervision Manual
3. Operation and Maintenance Manual
4. Special Reports/Engineering Reports/Environmental Compliance Reports
5. Contractor's Quality and safety reports

12.12 Final Completion Report

The Consultant shall prepare a comprehensive final Completion Report for each of the construction contract, which reaches a stage of substantial completion during the period of the services. These reports, which must be submitted immediately after the taking over of each section wise, shall summarize the design modifications, design challenges, method of construction, the construction supervision performed, problems encountered, solutions undertaken and recommendations for future projects of similar nature to be undertaken by the employer. The DDC shall then summarize and consolidate in a single Final Completion Report, the key information from the monthly reports and submit to the Employer.

CHAPTER 13

CHECKING & REVIEWING PROCEDURES

13.1 STANDARD OF SERVICES

1. The DDC shall be responsible for the correctness and technical merit of its designs, calculations, drawings and all other documentation prepared by them in carrying out the services.
2. The DDC shall ensure that qualified and experienced staffs are employed in sufficient number and that accurate, consistent, clear and easily legible drawing and documents are produced on time
3. The DDC shall comply with the provisions and procedures covering standards and codes, drawings and calculations. The DDC shall also comply with the checking procedures as stated below.
4. The DDC shall submit the designs, drawings and documents in an orderly, sequential and progressive manner as a whole in line with latest updated (once in 15 days) and approved design rolling programme and schedule.
5. The Design Requirement Plan(s) shall define the DDC policy for the design of the contracted works and shall, without limitation, define

   (a) The organization of the Consultant's design staff.

(b) The specific allocations of responsibility and authority given to identified design staff with reference to the review and verification of design drawings and calculations by the DDC.

(c) The specific methods of design to identify any relevant Method Statements and develop those Method Statements to a degree of detail sufficient to permit the Employer to understand.

13.2 CHECKING PROCEDURES

The DDC shall establish a Quality Assurance Plan (QAP) and a system of their internal audit and approval of all designs, including calculations, drawings and other documents prepared and issued to the Employer/Employer' 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 the contract. Internal checks shall be carried out by personnel who have experience and competence as far as possible equal or superior to the originator, but who have not been involved in producing the original design. All the design drawings and calculations shall be checked by lead design checker (LDC) & then to be submitted to Employer/Employee Representative.

Design review checklist must include all calculations, drawings and other requirements for the design of complete system for each discipline (Civil, Structural, Architectural, MEP, VAC). The list shall be verified and validated by the independent design checker and the same submitted for notice of no objection prior to precede the preliminary design.

13.3 Proof-checking consultant/ Lead Design Checker/ Checkers

The PMC shall engage reputed external independent consulting firm(s) to act as the Lead Design Checker for various systems and disciplines like civil, architectural, and structural, E&M, Tracks etc. and subject to prior approval of Employer/Employer's Representative. The Lead Design Checker shall not produce any of the design or temporary works designs as a part of the DDC's team.

At the outset of project, PMC shall propose the tentative list of potential lead design checker firms which it intended to engage during production of design and drawings during Design Phase and during construction phase, to endorse all the designs, drawings, modifications, calculations etc. PMC shall seek approval from Employer for engagement of lead design checker firms and inform at least one month in prior before replacing the lead design checker, failing which PMC will attract a penalty equivalent to 4 lakhs per month.

The Lead Design Checker Firms for various disciplines shall have at least total design experience of ten (10) years, with at least seven (07) years experience in handling design of large, complex design project(s) that includes Metro Rail Project work of a similar nature. Experience may include management of design projects that include the types of work included in the Scope. The Lead Design Checker's shall be assisted by a team of Design Checkers to cover the full scope of the design required by this Contract.

The Lead Design Checker's shall issue a written report to the Employer/Employer's representative, covering the status of all designs checked during the preceding month.

The Lead Design Checker/s shall undertake design checks on the DDC's designs. All design documents, drawings, plans, calculations and reports produced by the DDC shall be proof-checked by the Lead Design Checker/s, accompanied by two original copies of a Design Certificate', when the design is submitted to the Employer/Employer's Representative.

The Consultant shall ensure that at the end of each month, the Lead Design Checker shall issue a written report (Lead Design Checker's review report) to CMRL, with a copy to the Employer's Representative, covering the status of all designs checked during the preceding month without fail. The checker review form as per approved format should be submitted along with each submission without fail.

The DDC shall ensure that, as all designs are for complex structures and have the potential to affect the safety, quality and durability of the Permanent Works, the Lead Design Checker/s shall approve in advance the DDC's proposals before they are executed on site.

In the event that the Employer/ Employer's representative identifies and notify the same to DDC, significant errors or inconsistencies in the deliverables, the applicable design checker's to be immediately removed by DDC (within 1 month) from the design team and be replaced with a competent design checker after due approval from Employer.

The Employer/Employer's Representative shall have full and unrestricted access to the Me Dead Design Checker's and to all persons carrying out the design checking, and all their data, information, calculations, drawings and records.

13.4 **Endorsement of Design Calculations**

All calculations, including any amendments thereto, shall be endorsed as checked and approved prior to issuing to the Employer Employer Representative, being initialled and dated by both the originator, lead designer and the lead design checker's. All the signatures on the cover sheet of authorised personnel including the LDC shall be original handwritten signature

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

1. A brief description of the structure and its assumed mode of action
2. The loads that will act upon the structure:
3. The allowable stresses of the structure
4. A brief statement description of the method of analysis used .
5. A brief statement description of the method of design;

6. Details of the computer program used,
7. A key to symbols used: and
8. A design summary.
9. Calculations for E&M, VACshall include, but not limited to:
   - Calculation of connected load, maximum demand and short circuit
   - level at each panel & distribution board;
   - Cable sizing including voltage drops:
   - Lighting levels preferably by ISO-lux profiles and calculation for luminaries.
   - Lightening protection system including number of down cameras,
   - Heat load calculation for each room/ area for air-conditioning
   - Calculation of connected load & maximum demand for normal, DG & UPS supplies.

13.5 Endorsement of Drawings and Documents

Each document and drawing, including any revisions thereto, shall be endorsed as checked and approved prior to issue to the Employer/Employer' Representative by being initialled and dated by both originator and lead design 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.

13.6 Pro-forma of Certification by Lead Design Checker (LDC certification)

A certificate signed by the Lead designer of the DDC stating that all drawings and documents have been checked and approved in accordance with the approved QA Plan and complying all the contract specifications and then issued to Employer/Employer' Representative. The person preparing the design and drawing will initial all documents prepared by him.

13.7 Quality Assurance Plan (QAP)

QAP shall be submitted to Employer/Employer' Representative for approval. The QAP shall identify the personnel, procedures, instructions, records and forms necessary the plan with the following minimum requirements:

1. Certification process of drawings and documents for issue,
2. Organisational structure,
3. Design control including study and design input/analysis,
4. Checking of documents;
5. Document control,
6. Subcontractor control
7. Internal quality audit, and
8. Corrective action.

The DDC shall also identify the requirement of Quality Level and incorporate a Quality

Level List in the QAP for each construction contract. The procedures to be applied to manage and control the quality of the design work, with particular reference to the following:

1. The design and performance requirements which shall be defined in terms of basic data and design assumptions made; relevant codes, standards and regulatory requirements, safety, security and environmental requirements, and commissioning requirements:
2. The design methods. Software applications to be used in the design, both proprietary and public domain, shall be identified and any requirements for physical and mathematical model testing.
3. The preparation, checking, issue, distribution, indexing and filing reports, calculations, drawings and specifications along with the means of their revisions;
4. The formal design review, authorization and approval of design documentation,
5. The design verification and validation;
6. The design checks by the Design Checker; and
7. List of examples of the forms and formats to be used to record the activities under the Design Plan shall be attached at the end of each section or a reference included to existing standard procedures.

13.8 **Quality Audits/Monitoring**

Quality Audits and monitoring of the DDC's QAP will be conducted by Employer/Employer Representative at intervals commensurate with the DDC's activities,

13.9 **Responsibility**

The DDC shall remain responsible for the quality of the documents.

CHAPTER 14

DESIGN DOCUMENT SUBMISSION REQUIREMENTS (DESIGN DELIVERABLES)

14.1 Submission of Documents & Designs

The design, including preliminary drawings and drafts of the Bill of Quantities with specifications substantially developed to define the Works, including, but not limited to, locations, shapes and sizes shall be submitted to the Employer/Employer' Representative for the Review, approval and further tendering purposes.

The DDC shall maintain records showing design calculation and data supporting design review activities. The Employer has reserved the right to inspect and audit these documents at any time to verify the effectiveness of design reviews.

The DDC shall deliver all the drawings and documents produced / prepared in connection with this contract. They will be packaged as directed by the Employer/Employer' Representative.

Any changes to design proposed by DDC / Employer already checked by its Design Checker shall be dealt with as an entirely new design submission and the Contractor shall not be entitled to any increase in the Contract Price or extension of time in such circumstances.
All the Design Deliverables to be submitted in the form of Hard and Electronic Copies to the Employer. In addition, all the Data including the deliverables and other documents related to DDC shall be stored in a Hard Disk and handed over to Employer within 30 days from the date of submission of Tender documents of the works as per the deliverables Tabulated under clause 14.7.

The DDC shall prepare and present drawings describing the civil, structural, architectural, Tracks, MEP, VAC design which shall, at a minimum, include, but not be limited to:

1. Site plans.
2. Sections and elevations,
3. Construction sequence drawings.
4. Plans, sections, elevation and sketch design studies of all typical features. Typical repetitive conditions to be noted as such and located.
5. Design calculations to reflect the definition of the Works.
6. Drawings detailed to define the Works with reinforcing details:
7. Bill of Quantities for all the works in sufficient accuracy to be able to proceed to Tender,
8. Technical specifications in sufficient detail of materials and workmanship to permit tenderers to bid for the work.
9. A design brief for MEP services covering the basis/ principles/ norms followed for various activities. Draft drawing for all design to be submitted for tendering purposes.
10. An outline Construction Programme with consideration of construction methods &
11. A draft description of assumed construction methods.
12. Initial construction cost estimates
13. Comments, if any, on the documents supplied by the Employer/Employer' Representative:
14. Any other documents that may have been requested by the Employer/Employer' Representative.

    All drawings shall be submitted in legible copies of the appropriate size.

The consultant shall provide the following Design Deliverables (common for Chapter-5 Functional design requirements for civil & structural design and Tracks works and chapter 7 - Functional requirement of E & M. Plumbing works**) to the Employer/Employer's Representative for review and notice:**

14.2 Preliminary Design Submission

1. Site Plans for each station, ancillary facility, or property development proposal, including surrounding land uses, existing or proposed buildings and infrastructure, as well as any proposed additions, modifications, or required demolition.
2. Quality Assurance Plan for Design

3. Overall Site plans, floor plans, elevations, Sections, sketches/ perspective exterior/interior views etc.
4. Materials and finishes presentation.
5. 3D Models and animations.
6. Area Schedule (net and gross as applicable)
7. Submission of Design Manuals.
8. Submission of draft technical specifications proposed for the work
9. Identification and submission of Design codes and standards
10. The CAD procedures
11. Preliminary Track layout, drainage details, shunting arrangements etc. for the Depot.
12. The preliminary construction methodology (launching schemes, sequences etc.).
13. The design submission programme.
14. Site surveys, existing building surveys, and other field survey.
15. A review of permanent land requirement.
16. The preliminary building and structure protection proposal, Potential Damage Assessment
17. The preliminary monitoring plan (Instrumentation and monitoring plans)
18. Preliminary MEP, VAC plans.
19. Any other requirement defined by Employer.

14.3 Definitive Design Submission

1. The dimension of all major features, structural elements and members
2. General arrangements of all required rooms and facilities of the depot including a finishes schedule for all rooms and spaces for doors and windows, etc., and details of all architectural parts necessary to describe design condition and methods of application and construction
3. Elevations and perspectives and landscaping
4. Layouts and details of structural elements
5. Associated fittings
6. Slopes and earthworks
7. Structural and surface drainage
8. Potential forces and movements due to all possible loadings and actions on the structures, and their accommodation.
9. All second order effects
10. The layout and typical details of reinforcement in structural concrete members.
11. The location and nature of all relevant joints and connections and details thereof Standard details.
12. Location, geometry and setting out of depot Buildings and features as applicable
13. Provisions and proposals for construction interfacing with the interfacing contractors
14. Construction sequence and details of stations and Depot
15. MEP, VACitems in, Stations, Depot.
16. BOQ, Detailed estimates and detailed specifications for the preparation of tender for stations, Tracks, MEPVAC, Depots etc.
17. Floor plans (dimensioned), elevations (confirmed floor-to-floor heights), sections.

18. Sketches of critical and typical details.
19. Perspectives
20. Typical reflective ceiling plans.
21. Design calculations to reflect the definition of the Works Electrical drawing comprising as a minimum of the following: Cable tray layouts showing section of cable tray at different places, number of Cable, spacing, spare capacity. Equipment layout of generator room. UPS room, LT switch room, pump room, and other such equipment room showing layout of equipment, cable tray/trenches/ladders/raceways, clearances and spacing. Lighting protection layout, Aircraft warning layout (If required) Fixture mounting arrangements.
22. Air conditioning layout
23. Detail design of electrical panel, cable size calculation
24. Other details as may be necessary for proper execution of requisite E&M works
25. Earthing single line diagrams. The location of earth pits may be shown on electrical layout.
26. Updated design features (options) report (with recommended option to take to detailed design), including serviceability issues
27. Fire drawings comprising as a minimum of the following: Fire detection single line diagram, Fire detection system layout floor wise, Fire suppression single line diagram, Fire suppression layout floor wise and external layout, Details of various sub-systems. sprinkler layout, automatic gas flooding (as applicable).
28. Electrical plant rooms such as UPS, DG set etc.
29. Provisions for railway works electrical and mechanical services and equipment
30. Proposed utilities
31. SEM drawings
32. Embedded items
33. Reinstatement drawings.

14.4 Construction Reference Drawings

1. Full set of drawings including but not limited to site plans including datum, boundary definition and orientation associated works, landscaping etc., floor plans, elevations, sections etc. suitable for construction.
2. Drawings detailed to define the Works with reinforcing details.
3. Key plans
4. Reflective ceiling plans at each level including coordinated lighting and services fixture.
5. External elevations
6. Interior elevations
7. Cross-sections and longitudinal sections.
8. Roof plan with falls, gutters, rainwater heads and downpipes
9. Electrical/ lighting outlet and switching plans.
10. Plumbing layout and schematics.
11. SEM, CSD, cut-out details along with correct sizing cross-referenced to plans and sections.

12. Construction details at all typical and atypical locations cross-referenced to plans and sections
13. Plans, section of access stairs, ramps, balustrades, barrier and handrails, including access to equipment rooms, Firefighting, UPS, DG set, Transformers etc.
14. Interior fit out including wall elevations and joinery details.
15. Schedule of internal and external finishes.
16. Building specifications, performance specifications for any works involving construction design.
17. Civil, Structural, Architectural, VAC, Tracks, MEP designs.
18. All items provided in definitive design to be updated to construction reference drawings (CRD) incorporating all the required design changes.
19. Detailed estimate (BOQ), performance specifications and construction specifications required for floating the tender.
20. Tender technical specifications for equipment/materials for systems designs (MEP/ VAC) shall include, but not limited to

    (a) General requirements
    (b) Manufacturer's eligibility criteria, Quality assurance and performance requirements
    (c) Documents required for vendor submittal
    (d) Technical requirements
    (e) Requirements for the factory Visit and Factory acceptance test
    (f) Installation requirements - Method statement for the installation along with the typical installation drawings with detailed drawings. Drawings shall contain plan view, elevations, sections, schedules, schematics and other details as required to fully covering the works.
    (g) Testing and Commissioning requirements
    (h) Signage requirement for equipment and Materials
    (i) Detailed Scope for CAMC (comprehensive annual maintenance contract) requirements shall be included in the Tender documents.

14.5 GOOD FOR CONSTRUCTION DRAWINGS

All the CRDs shall be marked as 'GOOD FOR CONSTRUCTION" for each contract package incorporating any changes necessitated due to site constraints or site requirements, interface requirements, system contractor interfacing requirement, if any, after review as deemed necessary by DDC/Employer/ Employer's Representative.
The procedures for the control of design changes during construction phase shall be submitted by DDC after GFC drawings are issued in such an order that design changes are reviewed, verified, validated and approved before implementation.

14.6 The DDC shall submit all the drawings and documents for each discipline (Civil, structural, architectural, Tracks, MEP, VAC, as applicable) produced / prepared in connection with this contract and tentatively as detailed in Attachment B in 3 sets of drawings (A1 & A3),

documents, reports etc. as required by Employer along with two sets of soft copies in the form of CD/DVDs. They will be packaged as directed by the Employer/ Employer's representative.

14.7 Timeline for submissions:

No.	Description	Key Dates (COS+ No of Days)
1	**Civil Design Works**	
1.1	Preparation and submission of Conceptual design	30 Days
1.2	Preparation and submission of Definitive Design	60 Days
1.3	Preparation and submission of Construction Reference Drawings and Combined Services Drawing for tender purpose	100 Days
1.4	Preparation and Submission of Bid Document for procurement of construction contracts to Employer	120 Days
1.5	Preparation and submission of GFC drawing	Within 7 days from award of civil contract
1.5	Site Coordination and Interface for the complete period of the Assignment.	Entire assignment period.
2	**E&M Design Works**	
2.1	Preparation and submission of Preliminary Design/Preparation and submission of Definitive Design.	30 Days
2.2	Preparation and submission of Construction Reference Drawing (CRD along with LDC certificate.	90 Days
2.3	Obtaining Approval of CRD drawing	120 Days
2.4	Preparation and Submission of Bid Document for procurement of construction contracts to Employer.	150 Days
2.5	Preparation and submission of GFC drawing.	Within 7 days from award of E&M contract
2.6	Site Coordination and Interface for the complete period of the Assignment.	Entire assignment period.
3	**Track Design Works**	
3.1	Study the existing track alignment and land availability within the depot and on the connection tracks. Based on this, prepare a new alignment within the existing depot boundary to accommodate the proposed additional rolling stock and simplify train feeding to the mainline.	30 days
3.2	Preparation and submission of Preliminary Design and Definitive Design.	30 Days
3.3	Preparation and submission of Construction Reference Drawing (CRD) along with LDC	100 Days

	certificate and obtain approval from Employer. Updating of Combined Service drawings and validation.	
3.4	Preparation and submission of Tender Document with drawings to execute the Track contraction works.	185 Days
3.5	Preparation and submission of GFC drawing	Within 7 days from award of track contract
3.6	Site Coordination and Interface for the complete period of the Assignment.	Entire assignment period.

Note:

Delay in completion of the aforementioned works shall attract Liquidated Damages at a rate of 0.01% of the Total DDC cost per day. The total Liquidated Damages shall not exceed 10% of the total DDC cost.

CHAPTER 15

ORGANISATION OF THE DETAILED DESIGN CONSULTANT

15.1 The Consultant shall establish an efficient organization for carrying out all services according to programme requirements. The Consultant shall furnish the CVs of all the key personnel working on this project for approval of Employer.

15.2 The organization shall provide effective management of the tasks of the contract including those that must be carried out concurrently by separate disciplines and teams. The organization shall also ensure that all information that becomes available during the design period is directed to the appropriate design teams and effective checking procedures are continuously maintained to ensure that required standards are met. Proper coordination between the different disciplinary of consultant shall be maintained. All the design and drawings will be certified by all the expert of concerned disciplinarians/ Key- Personnel.

15.3 Consultant shall have their full-fledged office in the location approved in Chennai.

15.4 Employer may regularly inspect / audit/oversee the working of the Consultant.

15.5 All key personnel should not leave the project without prior approval of the Employer.

15.6 The Consultant shall be required to form a multi-disciplinary team for this assignment. The Consultant's Team shall be manned by an adequate number of experts with relevant experience in the execution of similar detailed design and supervision assignments.

15.7 The Consultant shall propose a list of personnel but not limited to the followings, along with estimated staff man-months based on project scope requirements. The proposed staff deployment plan shall be subject to review and approval by the Employer.

Sl. No	Key Personnel	Nos	Tentative Deployment
1	Lead Designer-Civil (DDC)	1	Entire Duration of DDC Scope of works
2	Lead Designer-Track (DDC)	1	Entire Duration of DDC Scope of works
3	Lead Designer-MEP (DDC)	1	Entire Duration of DDC Scope of works
4	Senior Quantity Surveyor (DDC)	1	As and when required
Note:	A Penalty of INR 4 Lakhs per month per key personnel shall be imposed for non-deployment of key personnel as per agreed deployment schedule; Key staff are permitted to work from their headquarters in addition to Chennai office. But they have to be available to meet the requirements of CMRL as & when required.		

PROJECT TEAM OF THE CONSULTANT- KEY PERSONNEL

S. No.	Key- Personnel	Experience
1, 2, 3	Lead Designer / Civil (Station & Viaduct) / Track / MEP- DDC	Total Design Experience – 10 Years
		Relevant Design Experience in the role of Lead designer or Senior Structural Engineer in the design in Metro / Railway Works – 7 Years
		Minimum Educational Qualification- Engineering Graduate from a reputed Institution Desirable Educational Qualification- Postgraduate from a reputed Institution.
4.	Senior Quantity Surveyor-cum - Bid Manager – DDC	Total Experience – 7 Years or more
		Relevant similar Experience in Metro/ Railway & Large/ Heavy Infrastructure projects like Power Projects / Factories – 5 Years
		Minimum Educational Qualification - Diploma in Civil / Electrical / Mechanical Engineering from a reputed Institution. Desirable Educational Qualification - Degree in Civil / Electrical / Mechanical Engineering from a reputed Institution.

		Relevant similar Experience in Metro/ Railway & Large/ Heavy Infrastructure Projects like Power Projects / Factories

15.8 The Consultant shall maintain an Attendance Register (man-hours also). The Consultant shall furnish a certificate that all the personnel as envisaged in the Contract Agreement have been deployed in the Project at the time of submission of every bill to the employer.

CHAPTER 16
DUTIES AND RESPONSIBILITIES OF DETAILED DESIGN CONSULTANT

a)	The consultant shall initiate the design works, in consultation with Employer, and actively pursue and involve itself in all investigations and enquiries, consultations, studies, and compliance with pertinent information and data, convening of and attendance at design meetings, and in any other activities as are or may be necessary for producing the detailed design, drawings and documents to the specified requirements.
b)	The duties of the consultant will also include the issue of decisions, certificates and instructions as specified in the construction contract documents
c)	The consultant shall carry out the Services in accordance with best industry practices, in compliance with the provisions of the Agreement. Consultant at its own expense shall make any or all changes necessary to ensure that their design, drawings and documents conform to the intent and purpose set out in the Agreement.
d)	The consultant as a professional and experienced consultant providing full consultancy services, shall accept full responsibility for the correctness and technical merit of the services performed.
e)	The consultant shall assist Employerin obtaining the necessary design and regulatory approvals from the appropriate authorities for the stations, station areas, depot and any associated joint developments.
f)	The broad scope of services is classified in terms of activities. All the incidental services related with pre-construction phase, construction and post construction phase including additional related details, approvals, completion/ occupancy certificates etc. shall be deemed to be included in the scope of services of Architect. No extra payment shall be made for such incidental services.
g)	The Consultant is held totally responsible for the drawings issued for construction. If any mistakes or omissions are found during the execution, the Consultant will be held responsible and will clarify these mistakes or omissions, such clarifications shall not be considered as additional services requested by employer. Any approval of the

	drawings by the Client shall not hold the Client responsible for any lapses or mistakes and the Consultant shall be totally responsible for the same.
h)	The Consultant shall engage the Lead Detailed Designer who shall undertake and prepare the design of the Permanent Works and Temporary Works. The DDC shall establish an office for his lead design team near the Site area in Chennai. The lead design team shall function from this office and all meetings and discussions relating to design shall be held in this office.
i)	The Consultant shall ensure that the Designer continues to be represented in Chennai at all times by staff whose seniority and experience are to the satisfaction of the Employer/Employer's Representative and whose representative is available on the Site as necessary or as required by the Employer.
j)	The Consultant shall appoint a suitably qualified person(s) to act as the Lead Design Checker, or engage staff from an external consulting firm if he so wishes. The Lead Design Checker shall not produce any of the design or temporary works designs not work directly for or report to the Contractor's Project Manager.
k)	The Consultant shall ensure that at the end of each month, the Lead Design Checker shall issue a written report to the Employer's office, covering the status of all designs checked during the preceding month which should include the LDC comments and solutions provided by the designer at consultant end. The format of the Design Checker's monthly reports shall be one to which the Employer/Employer's Representative raises a Notice.
L)	The Lead Design Checker shall undertake design checks on the Contractor's designs. All design documents, drawings, plans, calculations and reports produced by the Contractor and Designer shall be checked by the Design Checker, accompanied by two original copies of a 'Design Certificate' as set out in Attachment A, signed by all parties when the design is submitted to the Employer. It is must that all the designs, drawings, report, manuals should be signed by the lead designer. The lead designer should be an individual or group of three, acquiring expertise, understanding and should have handled architectural, structural and MEP works of such nature and magnitude
M)	The DDC shall ensure that, as all designs being complex structures and having the potential to affect the safety, quality and durability of the Permanent Works, the Lead Designer shall approve in advance the Contractor's proposed materials and erection and removal procedures, and the lead designer shall inspect all temporary works at Site before they are put into use.
n)	The Employer/ and such other parties as he shall give a Notice in writing, shall have full and unrestricted access to the Lead Design Checker, the Lead Designer, and to all persons carrying out the design and checking, and all their data, information, calculations, drawings and record

o)	The DDC shall submit his Design Quality Assurance Plan as required for the design by the Contract.
p)	Provide design support, review Shop/ fabrication drawings and other drawings submitted by the contractor and be available for any clarification, review the work for compliance with the design and carry out design changes required during construction including testing and commissioning of the installations.
q)	Assist the contractor to prepare the As-Built Drawings by releasing soft/ hard copy of contract drawings and reviewing and commenting on the contractor's draft submissions.
r)	The client may review the work carried out by the architect at architectural planning. detailed engineering or at any pre-constructional stage to get satisfied with the standards and procedures adopted by the architect. It shall be the responsibility of the architect to make available the concerned documents to the client/ Consultant on demand. All the documents shall be submitted in Hard & Soft Copies.

CHAPTER 17

SOFTWARE SUPPORT

17.1 The Consultant shall provide copies of all computer programs, licenses valid for full duration of the contract and full support to the Employer or Employer's Representative for all computer programs used/proposed to be used, by the Contractor under this Contract. All such computer programs, licenses, and related data shall be handed over to the Employer through hard disk(s). The programs shall be installed and operated on computer systems provided by CMRL, based on the minimum hardware and system requirements specified by the Consultant.

17.2 Computer Programs . The DDC shall submit details of all computer programs and tools it intends to use during the design process. 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. Software support (to supply in CMRL with name, validity till duration of the contract etc). The software to be used for design of specific tasks shall be proposed by the DDC and approved by CMRL (latest versions available to be used). The license for the same used software shall be purchased in the name of CMRL for the entire duration of the contract.

17.3 The Consultant shall submit a software support plan immediately after award of work but before commencement of software installation. This plan shall require the Consultant to provide all changes, bug fixes, updates, modifications, amendments, and new versions of the program as required by the Employer/ Employer's Representative.

17.4 The Consultant shall provide all tools, equipment, manuals and training as necessary for the Employer/Employer's Representative to use, maintain and re-configure all of the software provided under the Contract.

17.5 The Consultant shall submit all new versions to the Employer/Employer's Representative for a Notice at least 2 weeks prior to their installation. New Versions of any program shall not result in any non-conformance with the Specification or degrade the operation of the System.

17.6 The Consultant shall a) ensure that all new versions are fully tested and validated on the simulation and development system prior to installation, b) ensure that all new versions are fully tested and commissioned once installed on the Site, c) deliver to the Employer and the Employer's Representative any new version, together with the updated Operation and Maintenance Manuals.

17.7 The Employer/Employer's Representative shall not be obliged to use any new version and that shall not relieve the Consultant of any of his obligations. Any effect upon the performance or operation of the computer-controlled system that may be caused by a new version shall be brought to the Employer/ Employer's Representative's attention including updating the files to suit the new version.

Error Correction

17.8 When a fault is discovered within delivered software or documentation, the Consultant shall take necessary steps to rectify errors or faults at the earliest

17.9 The Consultant shall provide written details as to the nature of the proposed correction to the Employer's Representative.

17.10 The Consultant shall notify the Employer promptly of any fixes or patches that are available to correct or patch faults.

17.11 The Consultant shall detail any effect such fixes or patches are expected to have upon the applications.

Training

17.12 The Consultant shall provide training for the Employer's staff to enable them to make proper use of any software, training for any new versions.

CHAPTER 18

Building Information Model (BIM) Requirements
Deleted

ATTACHMENT A

(This proforma is Indicative only, to be approved by the Employer before first submission)

DESIGN CERTIFICATE

This Design Certificate refers to Submission No……. which comprises:

[*Design Package No….. / the Definitive Design Submission/Construction Reference Drawings Submission No….. / Technical Submission No……] in respect of: [description of the Permanent woks to which the submission refers of

The contents of this submission are scheduled in Section A below

The documents scheduled in Section below, for which a Notice of No Objection has been issued, are of relevance to this submission

LEAD DESIGNER'S STATEMENT

We certify that:

a) the design of the Permanent Works, as illustrated and described in the documents scheduled in Section A below, complies with the Employer's Requirements, local …….regulations and standards and [see note 1 below]:

OR (in the case of a Definitive Design Submission in respect of those elements identified under Clause C2(6) of the Employer's Requirements - Design):

a) the outline designs, design briefs and performance specifications of those elements of the Permanent Works as illustrated and described comply with the Employer's Requirements and…..[see note 1 below)

OR (in the case of a submission n of documents that do not strictly comply with previous documents for which a Notice of No Objection has been received) :

a) the design of the Permanent Works, as illustrated and described in the documents scheduled in Section A below, complies with the Employer's Requirements and….. (see note 1 below) except in the following respects.

(i)…….. (to be completed by Contractor/Designer)

(ii)……(etc.)

b) A detailed review and design check has been undertaken and completed to confirm the completeness, adequacy and validity of the design of the Permanent Works as illustrated and described in the documents scheduled in Section A below.

c) all necessary and required approvals relating to the design of the Permanent Works, as illustrated and described in the documents scheduled in Section A below, have been obtained and copies of such approvals are annexed in Section C below.

AND (in the case of a submission covering a part of the Permanent Works only):

all effects of the design comprising the submission on the design of adjacent or other parts of the Works have been fully taken into account in the design of those parts.

Signed by Authorised Representative

(for Designer)

Name

Position/ Designation

Date

LEAD DESIGN CHECKER'S CERTIFICATION

We certify that the Work described in Section A of this certificate has been checked by us, and meets the requirements of the Contract

Signed by Authorised Representative

(for Design Checker)

Name

Position/Designation

Firm :

Date

Section A

Submission no. ……comprises the following

Drawings: (Title, drawing number and revision)

Documents: (Title, reference number and revision)

Others:

Section B*

Documents for which a Notice of No Objection has been issued and which are of relevance to this

Submission No. …..

Document:

submitted with

[Design Package No……./) The Contractor is required to

the Definitive Design Submission No……../) provide this information in

Construction Reference Drawings Submission No……/) respect of each document in

Technical Submission No……./) Section B

Date of Issue of Notice of No Objection)

(* Delete as appropriate)

*Section B attachment: Lead Design Checker's review form for each discipline to be submitted along with all the drawings (Format below):

Station/ Element/Component	Status	Unique Identification	Comments by Lead design checker	Response by Lead designer and closure of comments

Section C

[Consultant to attach copies of necessary and required approvals from statutory bodies, etc.]

ATTACHMENT B

Submittal	No. of Paper Copies			No. of Electronic Copies	Reference
	A1	A3	A4		
Initial services Programme & design submission programme plus with supporting information and narrative		3		2	
Monthly Programme Update		3		2	
Three Month Design Rolling Programme		3		2	
Three Week Rolling Programme		3		2	
Monthly Progress Report			3	2	
Preliminary and Definitive Designs	3	3		2	
Construction Reference Drawings	3	3		2	
Good for construction Drawings for each contract package as decided by Employer/ Employer's representative	3	3		2	
Construction sequence	3		3	2	
Reports and documents as applicable			3	2	
GADS, CSD (wall, ceiling, flooring etc.), SEM for each contract package as decided by Employer/ Employer's representative	3	3		2	
Design Quality Assurance Plan			3	2	
Final Completion Report			3	2	

Investigation, PDA, EBS and other survey reports.			3	2	
Any other submittals required by the Employer	3	3	3	2	As applicable

****** End of Section ******