CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE II

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION 1

NOTICE INVITING TENDER (NIT)

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONNAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
# CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE II

CONTRACT – PHASE II – DDC/P2C3/ 01

(Tender Notice No CMRL/PHASE II/ DDC/ P2C3/ 01/2018)

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NOTICE INVITING TENDER (NIT)

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/ P2C3/ 01/2018)

From:
Chief General Manager
UG-Construction
Chennai Metro Rail Limited
Admin. Building, CMRL Depot
Poonamallee High Road
Koyambedu, Chennai- 600 107
Tamilnadu, India

To
Name and Title of Signatory:
Name of Firm:
Address:

1. GENERAL

1.1 Name of Work:

Chennai Metro Rail Limited (CMRL) invites Open Tenders under two packet system from eligible applicants, who fulfil qualification criteria as stipulated in section 4: Evaluation and Qualification criteria, for the work, “ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

1.1.1 A firm will be selected under Quality and Cost based selection (QCBS) and procedures described in this Tender. Details on the proposal’s submission date, time and address are provided in clause 1.2 below.

1.1.2 The Tender includes the following documents:
Section 1: Notice Inviting Tender
Section 2: Instruction to bidder
Section 3: Scope of works
Section 4: Evaluation and Qualification Criteria
Section 5: Technical Bidding Forms
Section 6: Financial Bid
Section 7: Conditions of contract General Conditions (Part I) & special conditions (Part II)
Section 8: Project Particulars.
## 1.2 Key Details:

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<tr>
<td>1</td>
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<td>6</td>
<td><strong>Tender Documents on sale</strong></td>
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| 7 | **Cost of Tender Documents (Non-refundable)** | 1. The Tender documents can be downloaded from the internet, if so desired (see below for website details). There will be a non-refundable Tender submission fee of Rs.40,000/- (Rupees Forty Thousand only) or USD 627 (US Dollar Six Hundred & Twenty Seven Only) including GST in the form of Demand Draft in favour of Chennai Metro Rail Limited payable at Chennai to be submitted along with bid.  
2. A hard copy of the complete tender documents is available on payment of non-refundable fee Rs.50,000/- (Rupees Fifty Thousand only) or USD 784 (US Dollar Seven Hundred & Eighty Four Only) including GST from CMRL office in the form of Demand Draft in favour of Chennai Metro Rail Limited payable at Chennai. |
| 8 | **Pre-bid Meeting** | 06/03/2018 at 15:00 hours in the CMRL Conference Room  
Address:  
Chennai Metro Rail Limited, Administrative Building, CMRL Depot, Poonamallee High Road, Koyambedu, Chennai 600 107  
Tel No.044-2379 2000; Extn: 22347; Mobile No. 9445868300  
Fax No.044-2379 2200, Email id: agmcm@cmrl.in |
| 9 | **Last date of seeking clarification** | 07/03/2018 (Up to 14:00 hrs) |
| 10 | **Last Date of issuing addendum for pre-bid** | 10/03/2018 |
| 11 | **Date and Time of submission of Tender** | 22/03/2018 up to 14:00 hrs at office of the Additional General Manager (Contract Procurement) / CMRL, Address as mentioned in item No.8 above |
| 12 | **Date and Time of opening of Tender (At the place of submission)** | 22/03/2018 at 14:30 hrs at office of the Additional General Manager (Contract Procurement) / CMRL, Address as mentioned in item No.8 above |
| 13 | **Authority and place of purchase of Tender Documents with Contact Details** | Office of the Additional General Manager (Contract Procurement)/ CMRL , Address as mentioned in item No.8 above |
| 14 | **Bidders barred from bidding for this work** | The bidder or JV partners who have abandoned any contract executed for Government Metro Rail Corporation during the last 10 years are barred. None of the contracts executed by the bidder or JV partner should have been terminated by the Government Metro Rail Corporations in last 10 years prior to this bid submission. |
| 15 | **Website from which Tender Documents and any additional information can be downloaded** | www.chennaimetrorail.org |

**Note:** If the date of submission of tenders happens to be a public holiday, Tenders will be received and opened on the next working day at the same venue and time. Bidders are requested to check the website for regular updates.
1.2.1 Instruction to the Tenderers regarding Tender Documents downloaded from Internet:

It is advisable that the Tender Documents downloaded from the internet shall be printed through laser printer on A4 or equivalent size papers only. The submission of Xerox or photocopies of the Tender Documents is prohibited and in such case the submitted tender by the bidder will be summarily reject at any stage of the bidding.

(a) Tenderers should ensure that the downloaded copy of tender document is correct as per the master copy available in CMRL office. While execution of contract agreement the master copy available in CMRL office will be cross-referred and in case of discrepancy the later (CMRL master document copy) will prevail and will be binding to the tenderers. No claim in this regard will be entertained.

(b) Tenderers are required to register / fax or mail their details along with the declaration given below in sub-item (c), in exactly the same format to the address mentioned in Item 1.2 above, confirming that they have downloaded the tender document, so that they can be informed in prior in the event of any change in dates of pre-bid meetings, issue of addendum, etc.

(c) Declaration

I/We have downloaded the Tender forms from the Internet site [www.chennaimetrorail.gov.in](http://www.chennaimetrorail.gov.in) and I/we have not tampered / modified the tender forms in any manner. In case, if the same is found to be tampered / modified, I/we understand that my/our tender will be summarily rejected and the Tender Security deposited will be forfeited and I am/we are liable to be banned from doing business with CMRL and/or prosecuted.

2 TENDER SUBMISSION

2.1 The Tenderers may obtain further information and pre-bid clarifications, if any, in respect of these tender documents from the office of Chief General Manager (UG-Construction), Chennai Metro Rail Limited, Administrative Building, CMRL Depot, Poonamallee High Road, Koyambedu, Chennai-600107.

2.2 Tenders shall be submitted in sealed envelope at the time, date and the address given in Clause 1.2 of this NIT. Late or delayed tenders will not be accepted and will be summarily rejected.

2.3 CMRL reserves the right to accept or reject any or all proposals without assigning any reasons. No Tenderer shall have any cause of action or claim against the CMRL for rejection of his proposal.
2.4 One set of Tender Documents only shall be issued to each Tenderer and the original shall be returned along with the original Tender Drawings, with the Tender submittal duly signed and stamped on each page.

2.5 Tenderers should not have been blacklisted or deregistered by the Central Government, Government of Tamil Nadu, any PSU of Central Government or Government of Tamil Nadu or any Public Sector Metro in India during the last 10 years. Also, the Tenderer must not have failed to take possession or to commence any Contract after the Award of Contract.

Yours Sincerely,

Chief General Manager
(UG-Construction)
CHENNAI METRO RAIL LIMITED
CHENNAI METRO RAIL PROJECT PHASE II

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS
SECTION-2
INSTRUCTION TO BIDDERS

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
## Quality- and Cost-Based Selection (QCBS) –

### Instructions to Bidder

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Instructions to Bidders

A. General Provisions

1. Definitions

   (i) “PROJECT” means the project/work named in Contract.
   (ii) “SERVICES” means the services to be performed by the Detailed Design Consultant pursuant to this contract as may be amended from time to time.
   (iii) “EMPLOYER” means the Chennai Metro Rail Limited (also referred to as the “CLIENT” or “CMRL”) which expression shall also include their legal successors and permitted assigns.
   (iv) “EMPLOYER REPRESENTATIVE/S” means any of its officers nominated by CMRL and notified from time to time, to DDC.
   (v) “DETAILED DESIGN CONSULTANT” (DDC) means the professional firm, individual, party or the group named in the Agreement, who has to perform the services, and which expression shall include his/their legal successors and permitted assigns.
   (vi) “SUB-CONTRACTOR” means the sub-consultant appointed by Consultant with the prior approval of the Employer and in accordance with the procedure described in General Conditions of Contract.
   (vii) “TIME FOR COMPLETION” means the time for completion of the services stated for this purpose in the Contract.
   (viii) “DAY” means a calendar day.
   (ix) “MONTH” means a period of one month according to the Gregorian calendar.
   (x) “Applicable Law” means the laws and any other instruments having the force of law in India.
   (xi) “ITB” means the Instructions to bidder that provide the bidders with all information needed to prepare their Proposals.
   (xii) “Key Expert(s)” means an individual professional.
|  |  | whose skills, qualifications, knowledge and experience are important to the performance of the Services under the Contract and whose Curricula Vitae (CV) is taken into account in the technical evaluation of the Consultant's Proposal.  
(xiii) “NIT” (Section 1 of the contract document) means the Notice inviting Tender issued by CMRL in newspapers & internet.  
(xiv) “Non-Key Expert(s)” means an individual professional provided by the Consultant or its Sub-consultant and who is assigned to perform the Services or any part thereof under the Contract.  
(xv) “Proposal” means the Technical Proposal or the Financial Proposal of the Consultant, or both.  
(xvi) “QCBS” means Quality- and Cost-Based Selection.  
(xvii) “Sub-consultant(s)” means an entity or an individual to whom/which the Consultant intends to subcontract any part of the Services while remaining responsible to the Client during the performance of the Contract.  
(xviii) “SOW” (Section 3 of the bid) means the scope of works that enumerates broadly the objectives, activities, and tasks to be performed by DDC, respective responsibilities of the Client and the Consultant, and expected results and deliverables of the assignment. |
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<td>2. Introduction</td>
<td>2.1</td>
<td>The bidders are invited to submit a Technical Bid and a Financial bid, for consulting services required for the assignment.</td>
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<td>2.2</td>
<td>The Client will select a consulting firm/organization (the Consultant) in accordance with the QCBS method of selection.</td>
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<td>2.3</td>
<td>The Consultants should familiarize themselves with the local conditions relevant to the Services and take them into account in preparing their Proposals; including attending a pre-bid conference. Attending the pre-bid conference is optional and is at the Consultants’ expense.</td>
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|  | 2.4 | The Tenderer should visit the site to know the geological and topographical conditions and shall be familiar with the local conditions. The same should be submitted as “Familiarity certificate”.


### Section 3: Conflict of Interest

#### 3.1 Conflict of Interest

Please note that the DDC organization who will be awarded this work may be considered for general consultancy/Project Management consultancy works for future CMRL contracts, only when subject organization shall be participating as a separate entity of its organization, maintaining separate key personnel and non-key personnel, not engaged in the work of these present DDC contracts (i.e. P2C3-01, P2C3-02 & P2C5-03). Non-compliance of the above will lead to stern action as appropriate including blacklisting of the subject consultant for future contracts of Chennai Metro Rail Limited.

#### 3.2 Conflict of Interest

The Consultant has an obligation to disclose to the Client any situation of actual or potential conflict that impacts its capacity to serve the best interest of its Client. Failure to disclose such situations may lead to the disqualification of the Consultant or the termination of its Contract.

Without limitation on the generality of the foregoing, the Consultant shall not be hired under the circumstances set forth below:

#### 3.2.1 Conflicting Activities

Conflict Between consulting activities and procurement of goods or non-consulting services: A Consultant hired to provide consulting services for the preparation or implementation of this project, or any of its affiliates, shall be disqualified from subsequently providing goods or non-consulting services resulting from or directly related to the consulting services for such preparation or implementation.

#### 3.2.2 Conflicting Assignments

Conflict among consulting assignments: Neither a Consultant nor any of its affiliates shall be hired for any assignment that, by its nature, may be in conflict with assignment of the Consultant.

#### 3.2.3 Conflicting Relationship

Relationship with employer’s staff: A Consultant that has a close business relationship with the employer’s professional personnel who are directly or indirectly involved in any part of: (i) the preparation of the Terms of Reference for the assignment, (ii) the selection process for the Contract, or (iii) the supervision of such Contract, shall be disqualified.

#### 3.2.4 One Bid per Bidder

Based on the “One Bid per Bidder” principle, which is to ensure fair competition, a Consultant, and any affiliate that directly or indirectly controls, is controlled by, or is under
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| 4.      | **Corrupt and Fraudulent Practices** | 4.1 Undertaking Regarding Corrupt & Fraudulent Practice Should Be Submitted By Bidders- (*Form ELI-3*)  
In pursuance of this:  
4.2 CMRL will reject the result of evaluation of proposals if it determines that the Consultant evaluated has engaged in corrupt or fraudulent practices in competing for the contract in question; CMRL will recognize such Consultant as ineligible, for a period determined by Employer. |
| 4.3 | **Code Of Professional Ethics** | The Consultant shall have no direct or indirect interest in commercial, manufacturing or contracting activities that might tend to influence its professional judgment. It is remunerated solely by the fees paid to it by CMRL.  
It shall approach all assignments objectively and by using sound technical and economic principles provide solutions, which serve the best interests of CMRL.  
The Consultant shall give a declaration that its firm has no financial or managerial ties with other organization that could influence its independence. (*Form ELI-3*) |
| 5.      | **Eligibility** | 5.1 A Consultant that has been determined to be ineligible by in accordance with ITB 3.2 and ITB 4.1 above shall not be eligible to be awarded a contract.  
5.2 Bidders should not have been blacklisted or deregistered by the Central Government, any state Government, PSUs or any Metro Rail authority in India during the last 10 years. Undertaking for not being blacklisted should be furnished. (*Form ELI-2*)  
Also, the Tenderer must not have failed to take possession or to commence any Contract after the Award of Contract.  
Tenderers should produce an undertaking in this regard for any such rescindment enforced by previous employer if the contract is terminated/ rescinded by client.  
5.3 **Foreign bidders**  
Particulars to be furnished by foreign bidders (non-residents as per Income Tax Act, 1961):  
Foreign bidders should invariably submit (along with their bid) the following particulars, which are required to be furnished by CMRL to Income Tax Department for complying with the
requirements for making remittances to non-residents as per Income Tax Act, 1961 (as amended from time to time):
(i) Whether the non-resident has a Fixed Place Permanent Establishment (PE) or a Dependent Agency PE in India, in terms of the Double Taxation Avoidance Agreement (DTAA) between India and his country of tax residence through which the non-resident carries on business activities in relation to its engagement by CMRL and if, yes, address of the Fixed Place PE or name & address of the Dependent Agent?
(ii) Whether by carrying on activities in relation to its engagement by CMRL, the non-resident constitutes an Installation/Construction PE or a Service PE in India in terms of the DTAA between India and his country of tax residence?
(iii) If the non-resident has PE in India, whether the remittances to be made to him under his engagement by CMRL are attributable to such PE?
(iv) If the remittances to be made to the non-resident under his engagement by CMRL are attributable to a PE which it has in India, what quantum of the profits resulting to the non-resident from his engagement by CMRL, can be said to be attributable to the role played by the PE, and the basis of arriving at such quantum?
(v) If no part of the remittances to be made to the non-resident under his engagement by CMRL is attributable to a PE which it has in India, what are the reasons for the same?
(vi) Non-resident’s complete address (not necessarily in India).
(vii) If the non-resident has an Indian Income Tax Permanent Account Number (PAN).
(viii) Country of tax residence of the non-resident supported by a Tax Residency Certificate from the tax authorities of that country or the non-resident’s own certificate (only if it is not possible for the nonresident to obtain & submit Tax Residency Certificate to CMRL within a reasonable time).
(ix) Country which can be called the non-resident’s principal place of business. This could be the same as his country of tax residence or different depending on facts.
(x) Non-resident’s e-mail address.
(xi) Non-resident’s phone number with International Dialing code.
(xii) Whether the non-resident is constituted as a company, a partnership firm, or any other form of business organization.

In addition to above particulars, the bidder should also provide any other information as may be required later for determining the taxability of the amount to be remitted to the non-resident. Further, the bidder shall be liable to intimate the subsequent changes (if any) to the
### B. Preparation of bid

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<td>Preparation of Bid</td>
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<td>In preparing the bid, the Consultant is expected to examine the bid document in detail. Material deficiencies in providing the information requested in the bid may result in rejection of the Proposal.</td>
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<td>The Consultant shall bear all costs associated with the preparation and submission of its Proposal.</td>
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<td>6.3</td>
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<td>The Proposal, as well as all related correspondence exchanged by the Consultant and the Client, shall be written in English.</td>
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<td>7.</td>
<td>Bid Validity</td>
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<td>The Consultant's bid must remain valid for 6 (six) months from the date of submission of tender.</td>
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<td>During this period, the Consultant shall maintain its original Proposal without any change.</td>
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<td>Extension of Validity Period</td>
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<td>In exceptional circumstances the Employer may request that the bidders extend the period of validity for specified additional period. The request and the bidders' responses shall be made in writing. The bid security shall be extended up to 28 days after the deadline of the extended bid validity period. A bidder agreeing to the request shall not be required or permitted to modify its bid.</td>
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<td>Substitution of Key Experts</td>
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<td>Consultants shall not propose alternative Key Experts. Only one CV shall be submitted for each Key Expert position.</td>
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<td>Sub-Contracting</td>
<td>7.6</td>
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<td>The Consultant shall not, without written consent from the Employer, subcontract the whole or part of the Services. Sub – contractors engaged by the consultant shall be with prior approval of the employer and in accordance with the procedure described in conditions of contract.</td>
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<td>Clarification by bidder</td>
<td>Bidders may request a clarification of any of the contract documents up to the number of days indicated in the NIT before the proposal submission deadline date. Any request for clarification must be sent in writing, or by standard electronic</td>
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<td>Amendment of contract document</td>
<td>8.2</td>
<td>The Client may amend the contract documents by publishing the addendum in the website as mentioned above in sufficient time before the submission of Proposals as mentioned in NIT.</td>
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| 9. Preparation of Proposals – Specific Considerations | 9.1 | While preparing the Proposal, the Consultant must give particular attention to the following:  
(i) For the purpose of submitting a proposal, a bidder may enhance its expertise for the assignment either by:  
(a) associating with other firms as Sub-consultants, in which case the Consultant shall be solely liable under the Contract and the other firms shall be not liable for the Contract, or  
(b) Forming a Joint Venture with other firms which substantially perform the Services and/or have experience contributing to the enhancement of the expertise of the Joint Venture.  
9.2 In the event that the Consultant constitutes a Joint Venture/consortium, the Consultant shall submit:  
9.2.1 a copy of the Joint Venture Agreement with its Technical Proposal signed by all members to enter into the JV indicating parts of work to be executed by the respective members, and  
9.2.2 a power of attorney (executed by all members) that authorizes the designated lead or managing member of the Joint Venture to act for and on behalf of the Joint Venture and to legally bind such Joint Venture in any contractual or similar documentation. Any Joint Venture agreement and Joint Venture power of attorney shall be attached to TECH-1 form, and submitted as part of the Technical bid of such Consultant.  
9.2.3 Successful JV will formalize the JV agreement with detailed Memorandum of Understanding (MoU) between the members of the joint venture/consortium/partnership clearly stating the inter-relationship and division of work between the members with prior approval of CMRL. |
9.3 In the case of a JV or Consortium, all members of the Group shall be jointly and severally liable for the performance of the whole Contract.

9.4 A non-Indian firm is permitted to apply only in a Joint Venture or Consortium arrangement, with a wholly owned Indian subsidiary, which must be registered in India under the Companies Act – 1956, or with any other Indian firm, which will have a minimum participation interest of 30%.

Partners having less than 30% participation will be termed as non-substantial partner and will not be considered for evaluation which means that their financial soundness and work experience shall not be considered for evaluation of JV/Consortium.

10. Technical Bid Format and Content

10.0 The Technical bid shall provide the information indicated below:

10.1 The technical package, clearly labeled TECHNICAL PACKAGE will comprise of:
(a) Tender Security (EMD) along with tender document fee (applicable for downloaded tender documents from internet) in original in a separate sealed envelope. It must be noted that in case of a JV/Consortium, the Bank Guarantee (EMD in the form of Bank Guarantee) must be on behalf of the JV/consortium.
(b) Attested copy of Power of Attorney to submit Tender,
(c) Power of Attorneys from each member,
(d) The Memorandum of Understanding (MoU) for the consortium or joint venture in case of more than one member,
(e) Tax Certificates as mentioned in clause 10.2
(f) Technical Proposal along with credentials of each company/JV, Consortium all attested copies to be attached.
(g) All the issued or downloaded Tender documents (all Volumes including addenda & corrigenda), duly signed and stamped on each page by the authorized representatives of all parties of the JV/Consortium.

10.2 The Technical Package shall contain an attested photocopy of the last 3 Income Tax Returns filed by the tenderer. For foreign based consultants a suitable certified similar document from their country of origin, or a certified statement from their auditors stating that Income Tax/ Corporation Tax has been paid will be
## Contents of Technical Proposal

<table>
<thead>
<tr>
<th>10.3</th>
<th>The Technical Proposal (to be read in conjunction with section 4: EQC) should cover in detail the following:</th>
</tr>
</thead>
</table>
| 10.3.1 | **Experience of the Firm – Tech 2A & Tech 2B**  
*As an enclosure to form (Tech- 2A & 2B), the bidder (single firm or each member of JV) shall furnish Employer’s Certificate containing the following details for each contract submitted for evaluation under this criteria:*  
1. Project name  
2. Name and address of client/ employer.  
3. Brief description of scope of works.  
4. Contract agreement number and date.  
5. Type of contract.  
6. Name of the contractor (single entity or JV)  
7. Starting date and Contract duration  
8. Original date of completion  
**In case of JV:**  
9. Percentage participation of JV members  
10. Apportionment of works between JV partners.  
**Status up to 30th December 2017**  
11. Value of project at award.  
12. Percentage of works completed  
13. Value of work certified till date.  
If DDC has performed design services as a prime consultant for private contractor such experience will be considered for evaluation. Design services performed as sub-consultant to prime DDC consultant for any work shall not be considered for technical evaluation. |
| 10.3.2 | **General approach and methodology, work plan** to be submitted.  
The general approach and methodology should include understanding and comprehension of the work involved proposed for carrying out the services covered in the Scope of Work, including such detailed information as deemed relevant. |
| 10.3.3 | **List of proposed Key Expert team and Summary of CV particulars Key Experts’ CVs: Forms PER-1 & PER-2**  
Proposed key staff (minimum) to be deployed for important key areas of the DDC’s responsibilities to be categorized as detailed in Section 4, Evaluation & Qualification Criteria along with CV’s. (The majority of the key staff shall be regular members of the firm).  
The technical proposal will be evaluated based on the capabilities /
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<thead>
<tr>
<th>Table Cell</th>
<th>Text</th>
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<tbody>
<tr>
<td><strong>technical strength of staff proposed to be deployed.</strong></td>
<td>The name, background and professional experience of each key staff member to be assigned to the project, with particular reference to his experience of a nature similar to that of the proposed assignment.</td>
</tr>
<tr>
<td><strong>10.3.4 Expert schedule: Forms PER-3</strong></td>
<td></td>
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</tbody>
</table>
| a) An organization chart together with clear description of the responsibilities of each key staff member within the overall work programme. The DDC shall prepare the key staff of the Design team, Expertise team & Project coordination team such that they have relevant experience of not less than 10 years in the concerned field and have handled minimum 2 projects of similar nature & complexity. The leader of the expertise team in each area of discipline shall not have less than 15 years of relevant experience. Sufficient proof shall be submitted to Substantiate the qualification and experience of staff proposed to be deployed.  
| b) DDC shall also propose the tentative list of potential lead design checker/s which it intended to engage during production of design and drawings (Design Phase) and during construction phase to endorse all the designs, drawings, modifications, calculations etc. |
| **Information of Sub-contractors/consultants** |  
| 10.3.5 | The names and addresses of any firm who may be given sub-contracts with details of their experience.  
| | The details of the sub-contracted staff including Curriculum Vitae, background and professional experience with their consent letter.  
| | The details of equipment and laboratory facilities with such sub-contractors/ sub-consultants. |
| **10.3.6 Work Schedule: Forms PER-4** | A task list of deliverables and delivery dates, and the person responsible for performing the deliverable. |
| **Design Facility of the consultant** |  
| 10.3.8 | Details of design facilities together with their location. (Refer Section 4: EQC) |
| 10.3.9 | The offer should cover the entire Scope of Work, as laid out in the tender documents. |
| 10.3.10 | The Technical bid shall not include any financial information. A Technical Proposal containing material financial information shall be declared non responsive. |
**Section 2: Instruction to Bidder**

### 11. Financial Bid

<p>| | | |</p>
<table>
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<tbody>
<tr>
<td><strong>11.0</strong></td>
<td>Lump sum prices mentioned in the financial package should include all costs associated with design development, remuneration of staffs, transportation, equipment, printing of documents, surveys, establishments, overheads etc. complete with all respects to cover all activities required for: a. Services to be performed prior to the award of construction contracts, and b. Services to be performed during / after construction.</td>
<td></td>
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</tbody>
</table>

### Format and Content

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<table>
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<tbody>
<tr>
<td><strong>11.1</strong></td>
<td>The Financial Proposal shall be prepared using the Standard Forms provided in Section 6 of the contract.</td>
<td></td>
</tr>
</tbody>
</table>

### Taxes

<p>| | | |</p>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>11.2</strong></td>
<td>The Consultant and its Sub-consultants and Experts are responsible for meeting all tax liabilities arising out of the Contract unless otherwise stated in the contract.</td>
<td></td>
</tr>
</tbody>
</table>

### Currency of bid and Payment

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11.3</strong></td>
<td>Consultants shall submit their financial bids and other bid forms in Indian rupees only.</td>
<td></td>
</tr>
<tr>
<td><strong>11.4</strong></td>
<td>Payments under the Contract shall be made in INR only.</td>
<td></td>
</tr>
</tbody>
</table>

### C. Submission, Opening and Evaluation

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<tr>
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</thead>
<tbody>
<tr>
<td><strong>12.1</strong></td>
<td>The Consultant shall submit a signed and complete bid comprising the documents.</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
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<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>12.2</strong></td>
<td>The original Proposal shall contain no interlineations or overwriting, except as necessary to correct errors made by the Consultants themselves. The person who signed the proposal must initial such corrections and a separate index of such correction indicating amendments should be submitted in such cases. Submission letters for both Technical and Financial bid should be in the format prescribed in this contract [See also ITB 9.2 above.]</td>
<td></td>
</tr>
<tr>
<td><strong>12.3</strong></td>
<td>The Technical bid shall be marked “ORIGINAL” or “COPY” as appropriate. Three Copies of the signed/ initialed Technical bid shall be prepared. All required copies of the Technical Proposal are to be made from the original. If there are discrepancies between the original and the copies of the Technical Proposal, the original governs. All pages shall be initialed by authorized representative.</td>
<td></td>
</tr>
</tbody>
</table>
12.4 An authorized representative of the Consultants shall initial all pages of Financial bid. The authorization shall be in the form of a written power of attorney accompanying the Proposal or in any other form demonstrating that the representative has been duly authorized to sign. The signed Financial Proposal shall be marked “ORIGINAL.”

12.5 The original and all copies of the Technical bid shall be placed in a sealed envelope clearly marked “TECHNICAL BID.”

Similarly, the original Financial bid shall be placed in a sealed envelope clearly marked “FINANCIAL BID” and with a heading “DO NOT OPEN WITH THE TECHNICAL BID.”

The envelopes containing the Technical and Financial bid shall be placed into an outer envelope and sealed. This outer envelope shall bear the submission address, NIT No., and be clearly marked “DO NOT OPEN, EXCEPT IN PRESENCE OF THE OFFICIAL APPOINTED, BEFORE [insert the time………………………………and date of the submission deadline indicated in the Data Sheet]”.

The Client shall not be responsible for misplacement, losing or premature opening if the outer envelope is not sealed and/or marked as stipulated.

12.6 The contents required by the employer as part of the tender submission shall be organized as follows:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVER-A (Technical Bid)</td>
<td>Envelope-1</td>
<td>a) Bid Security (in accordance with ITB 21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Cost of tender in the form of demand draft for downloaded tender documents.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Declaration that tender document downloaded has not been tampered or modified.</td>
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</tr>
<tr>
<td></td>
<td>2) Envelope-2</td>
<td>Documents pertaining to Technical bid and all contract documents.</td>
</tr>
<tr>
<td></td>
<td>COVER-B (Financial Bid)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) Envelope-3</td>
<td>Documents pertaining to Financial Bid.</td>
</tr>
</tbody>
</table>

12.7 The bid must be delivered in person to the address/addresses indicated in the NIT and received by the Client no later than the time and the date indicated in the NIT, or any extension to this date in accordance with ITB 8.2.

12.8 The Client shall open the Technical Proposals immediately after the deadline for their submission. The envelopes with the Financial bid shall remain sealed and securely stored.

Additional Information

12.9 Every effort will be made to provide additional information to Tenderer that has been requested in writing. However, requests for additional information, and any delay in providing information is entirely at tenderer's risk, and shall not be considered as a reason for late submission of Tenders or a reason for delaying the submission of Tenders by the stated date. CMRL has right to collect any additional information/ clarifications during technical evaluation.

Confidentiality

12.10 From the time the Bids are opened to the time the Contract is awarded, the Consultant should not contact the Client on any matter related to its Technical and/or Financial Proposal. Information relating to the evaluation of Proposals and award recommendations shall not be disclosed to the Consultants who submitted the Proposals or to any other party not officially concerned with the process, until the publication of the Contract award information.

12.11 Any attempt by shortlisted Consultants or anyone on behalf of the Consultant to influence improperly the CMRL in the evaluation of the Proposals or Contract award decisions may result in the rejection of its Proposal.

12.12 Notwithstanding the above provisions, from the time of the Proposals’ opening to the time of Contract award publication, if a Consultant wishes to contact the CMRL on any matter related to the selection process, it should do so only in writing.
### Bid Evaluation

13.1 Any effort by Consultants to influence the Client in the examination, evaluation, ranking of bids, and recommendation for award of Contract may result in the rejection of the Consultants’ bid.

The evaluators of Technical bids shall have no access to the Financial bids until the technical evaluation is concluded.

### Evaluation of Technical bids

13.2 The evaluation committee shall evaluate the Technical bids on the basis of their responsiveness in particular to the scope of works, applying the evaluation criteria, sub-criteria, and point system specified in the Section 4: Evaluation and Qualification Criteria of this document. Each responsive Proposal will be given a technical score (St). A Proposal shall be rejected, if it fails to achieve the minimum technical score indicated in Section 4: Evaluation and Qualification Criteria of this document.

### Public Opening of Financial bids

13.3 The Client shall notify in writing Consultants that have secured the minimum qualifying mark, indicating the date, time and location for opening the Financial bids.

13.4 Financial bids shall be opened in the presence of consultant’s authorized representatives, and the total prices shall be read aloud and recorded. However, the quoted price will be subject to evaluation as per 13.6.

13.5 The financial bid of the technically non-responsive offer will be returned unopened.

### Evaluation of financial bids

13.6.1 The evaluation committee will review the detailed content of each Financial bid and the congruency of the Technical and Financial bid. Financial Proposals will be reviewed to ensure these are complete (i.e., whether Consultants have priced all items of the corresponding Technical bid); and correct any arithmetical errors and such other factors of administrative nature as CMRL may consider having potentially significant impact on contract execution, pricing and payments, rendering the bids unbalanced or unrealistically priced.

### Correction of errors

13.6.2 When correcting computational errors, in case of discrepancy between (a) a partial amount and the total amount the partial amount shall prevail; (b) words and figures, the words shall prevail.

If the tenderer does not accept correction of errors as outlined above, his tender will be rejected and tender security forfeited.

13.7 Following completion of evaluation of Technical and Financial bids, final ranking of the bids will be determined. This will be done by normally applying a weight as specified in Section 4:
<table>
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<tr>
<th>Section 2: Instruction to Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation and Qualification Criteria</strong></td>
</tr>
<tr>
<td><strong>13.8 Tenders for Three DDC works have been invited simultaneously and will be evaluated at the same time. Tenders will be awarded based on the total least cost to the Employer for the award of all three DDC contracts (P2C3-01, P2C3-02, and P2C5-03). While evaluating the employer will take into account all possible permutations of the possible awards that will provide the employer with least overall project cost. The Tenderer should note that if the Employer decides not to award any package for some reason, then the remaining packages will be awarded based on least cost combination without any liability to the tenderers.</strong></td>
</tr>
<tr>
<td><strong>14 Tender Security</strong></td>
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<tr>
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<td></td>
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<tr>
<td><strong>15 Rejection of bid</strong></td>
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</table>
following circumstances:
- a) Submission of incorrect or Fraudulent Power of Attorney.
- b) Submission of incorrect or Fraudulent Tender Security.
- c) Submission of incorrect Fraudulent or misleading qualifications relating to the Proposal.
- d) Submission of Fraudulent or incomplete credentials.
- e) Submission of incomplete Technical Proposal.
- f) Failure to sign, stamp and seal the tender document by any partner of JV/consortium during submission.
- g) Submission of conditional offer or any document altering the essence of the contract.

### D. Negotiations & Award of the contract

<table>
<thead>
<tr>
<th>16</th>
<th><strong>Negotiations</strong></th>
<th>16.1 The negotiations, if any, will be held at the CMRL office upon written communication with the Consultant's representative(s) who must have written power of attorney to negotiate and sign a Contract on behalf of the Consultant. CMRL will prepare minutes of negotiations that are signed by the competent authority of CMRL and the Consultant's authorized representative.</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td><strong>Availability of Key Experts</strong></td>
<td>16.1.1 The invited Consultant shall confirm the availability of all Key Experts included in the Proposal as a pre-requisite to the negotiations. Notwithstanding the above, the substitution of Key Experts at the negotiations may be considered if due solely to circumstances outside the reasonable control of and not foreseeable by the Consultant, including but not limited to death or medical incapacity. In such case, the Consultant shall offer a substitute Key Expert within the period of time specified in the letter of invitation to negotiate the Contract, who shall have equivalent or better qualifications and experience than the original candidate.</td>
</tr>
<tr>
<td>16</td>
<td><strong>Conclusion of Negotiations</strong></td>
<td>16.2 The negotiations are concluded with a review of the finalized draft Contract, which then shall be initialed by the CMRL and the Consultant’s authorized representative. If the negotiations fail, the CMRL shall inform the Consultant in writing of all pending issues and disagreements and provide a final opportunity to the Consultant to respond. If disagreement persists, the Client shall terminate the negotiations informing the Consultant of the reasons for doing so.</td>
</tr>
<tr>
<td>Section</td>
<td>Topic</td>
<td>Description</td>
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</table>
| 17      | Award of Contract | 17.1 CMRL reserves the right to accept or reject any or all proposals without assigning any reasons. No Tenderer shall have any cause of action or claim against the CMRL for rejection of his proposal.  
17.2 CMRL will issue a Letter of Acceptance to the successful Tenderer after the approval of the competent authority; thereafter within fifteen days from the date of issue of the Letter of Acceptance, the successful Tenderer will be required to execute the Contract Agreement for the consultancy services.  
17.3 Before signing of contract agreement the bidder should submit valid performance security. After the verification of performance security the contract agreement should be executed.  
17.4 The selected bidder must submit all the documents pertaining to project execution, organizational & mobilization charts and project implementation plans to CMRL for verification during “kick-off meeting”.  
17.5 The location of central/main office of the consultant shall be such as agreed with CMRL, but shall in any case be located in Chennai only for better coordination. |
| 18      | Publication | 18.1 The consultant/ sub-consultant including associated parties either alone or jointly with other, cannot publish, disclose or divulge any material/data relating to the services of the project to any third party without the written permission from the employer. |
| 19      | Data security | 19.1 The consultant shall implement appropriate technical and organizational measures to protect the Data/Information regarding the project against unauthorized or unlawful processing and against accidental loss, destruction, damage, alteration or disclosure. |
TENDER DOCUMENTS

SECTION 3

SCOPE OF WORKS

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONNAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
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<td>17.</td>
<td>CHAPTER 16: DUTIES AND RESPONSIBILITIES OF CONSULTANT</td>
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<td>ATTACHMENT A: FORMAT OF LDC CERTIFICATE</td>
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<td>ATTACHMENT B: DESIGN SUBMISSION SUMMARY</td>
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</table>
SCOPE OF WORKS

1.0 GENERAL

1.1 Introduction

The Employer has endeavored 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 maximum compensation agreed to herein, 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. The Scope of the Services is stated in the tender documents.

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 all details, drawings, arising from such coordination with others. Such co-ordination will take place throughout the contract period.

1.2 Relevant Documents

CMRL has already prepared a Detailed Project Report for the Phase-II, of Chennai Metro rail, and the design stages will be broadly based on this study. The relevant section of the DPR can be given to the successful bidder upon award of work through a written request to CMRL.

The field of intervention of the Detail Design Consultant will be in the following disciplines: Civil-Structural Works, Track design works, Architecture design works and Building Services (E&M, Environment Control Sysytem (VAC), TVS, BMS, SCADA etc) as specified in this scope of works.

All available design data available in Detailed project Report such as topographic surveys, utility surveys, commuter traffic data etc. & geotechnical information shall be made available to the Detail Design Consultant at the appropriate time after award of work as requested in writing by the consultant.

1.3 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 etc.), detailed designs, 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.

1.4 **Extent of Design Services:**

**Table: (P2C3-01) Brief Description of Work including civil, architectural, structural, tracks, MEP, TVS, VAC, property development, BIM etc. along with seamless integration of all the items as detailed below:**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Unit</th>
<th>Proposed Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UG section Tunneling by TBM/ NATM etc. excluding station lengths</td>
<td>R. Km</td>
<td>12.87</td>
</tr>
<tr>
<td></td>
<td>(including cut &amp; cover portion, launching shafts, retrieving shafts, mid- shafts, fit-outs and allied structures pertaining but not limited to the structure as applicable.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Cross-passages by NATM etc. including drainage systems, sumps, etc.</td>
<td>Nos</td>
<td>51</td>
</tr>
<tr>
<td>3.</td>
<td>Underground stations civil, structural and architectural works with finishes (Type-A, upto 190m length, with 2 levels) including E&amp;M, plumbing works, TVS &amp; VAC works etc</td>
<td>Nos</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Underground stations civil, structural and architectural works with finishes (Type-B, upto 150m length, with 2 levels) including E&amp;M, plumbing works, TVS &amp; VAC works etc</td>
<td>Nos</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Underground stations civil, structural and architectural works with finishes (Type-C, upto 150m length, with 3 or more levels) including E&amp;M, plumbing works, TVS &amp; VAC works etc</td>
<td>Nos</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>Tracks works (Permanent Way) for UG section (including station length complete in all respects)</td>
<td>R. Km</td>
<td>16.27</td>
</tr>
</tbody>
</table>
These Services generally include, but are not limited to:

a) Producing concept planning and design options of elevated, underground and interchange stations for Employer/ Employer’s representative review. The developed proposals shall be examined and finalized by CMRL management.

b) Review of alignment in general and station locations in particular with a view of optimization of neighbourhood connectivity and MMI integration;

c) Perform cost effective detailed designs of Architectural, Structure (including track supporting structure), Building Electrical and Mechanical services including Environmental Control (ECS), Tunnel Ventilation System and Building Management System (BMS) for the subject alignment based on approved designs and design criteria for all disciplines.

d) Manage the design task for cost, schedule and performance compliance;

e) DDC is required to propose suitable construction methodology after due approval from CMRL for the works like Cast in-situ and Pre-Cast Construction, structural system of viaducts for sub-structure and superstructure, pre-cast segmental box girder using external unbounded tendon, Precast U-Channel Superstructure with Internal Pre-stressing, Precast U-Channel segmental Superstructure with Internal Pre-stressing, Precast I-Girder Superstructure with Internal Pre-stressing, special span configuration, construction of tunnels for underground Alignment (earth pressure, mud-pressure, slurry type), launching and retrieval shafts, mid-way shafts, ring configuration, grouting & waterproofing, NATM methods for construction of cross passages, cut & cover ramps, earth retaining structures like sheet piles, soldier piles, secant piles, diaphragm walls etc., underground and elevated stations, geometric designs of tracks, design of MEP, VAC/TVS services etc. and prepare and submit a comprehensive reports along with the methodologies proposed by DDC for present scope for finalisation with CMRL before floating of tenders for construction works.

f) Proof checking of structural design and scheme of construction suggested by the Contractor for elevated & underground stations, ventilation, other shafts, ramps, sub-structure, tunnels, viaduct etc. as applicable for particular DDC package.

g) Drawings for construction shall be in such detail as not to require further design or detailing to be carried out by the construction contractor.

h) Perform detailed designs for building works, the fitting out of stations with architecture finishes and services including illuminations, lifts, escalators, water supply, drainage, power supply and other passenger amenities;

i) Perform detailed designs for multi-modal transfer facilities for road and pedestrian traffic, landscaping, traffic management and road and station interfaces for the surrounding roads and neighbourhood;

j) Review and suggest change as necessary in the detailed designs/ plans made by contractor for temporary and permanent diversion works for all utilities affected by
the station works / viaducts / tunnels as applicable for particular DDC package. Take into account utilities identified by contractors during execution and design structures accordingly. Provide items in the Construct Contract BOQ for diversion of these utilities. Review of alignment plan duly marked with, utilities identified by concerned agencies which will be given to DDC in hard/soft copies by CMRL.

k) 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;

l) Integration of Building Services with the existing M&E systems at interchange stations including fire compartmentation.

m) 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;

n) 3D Computational Fluid Dynamics (CFD) Analysis and 1-Dimensional analysis for all stations and tunnels to meet NFPA 130 (latest) requirements for tunnel ventilation system. The DDC shall also conduct value engineering studies for optimizing tunnel ventilation system capex and opex costs.

o) Prepare BOQs, special specifications, construction cost estimates for the associated construction contract for tendering by CMRL and modify the cost estimate as necessary before the contract is awarded. The BOQs, special specifications, construction cost estimate is to be prepared separately for stations (Excluding the BOQ of all structural elements of all underground works) and for BOQ of chartered utilities in a number of packages as decided by CMRL so as to facilitate CMRL to call construct only tenders in different contract packages

p) Incorporate and co-ordinate changes in design due to system wide interfacing with other DDCs/Contractors/CMRL;

q) Incorporate changes in design resulting from CMRL’s design reviews;

r) Consult and co-ordinate with various City and Government authorities that interface with the CMRL project. CMRL will assist with the co-ordination;

s) Prepare necessary documentation and obtain necessary planning and other required approvals for the integrated complex consisting of Station designs, Station layouts, space proofing, track supporting structures including E&M facilities and fire detection/suppression system, conceptual layouts and drawings for property development, if
any, from the relevant approving authority;

t) 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;

u) Maintain a Quality Control activity and an effective internal procedure for checking the accuracy of Work and assuring compliance with contract requirements;

v) Attend meetings connected with the Work whenever required; and

w) 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 CMRL’s site supervision staff in clarification of queries resulting from the design; to review and confirm Contractor prepared "As-Built" drawings.

x) 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.

y) 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.

1.5 Review of the present alignment

DDC shall review the present alignment and prepare a review report and submit to CMRL. The report should be prepared ascertaining the reasonableness, suitability and conformity with the general Arrangement Plan, profile of general alignment, topo-plans and strategic proposed station location within Right of Way, location of the stations Entry/Exit based on Land-Take Plans and topographical survey.

The initial vertical and horizontal alignment of the relevant stretch inclusive of its geometrics will be provided by Employer/Employer' Representative in soft copies. DDC should review the alignment considering site constraints geological & geotechnical conditions, resettlement & rehabilitation proposals etc. and submit a
revised alignment drawings along with soil lithological profiles to Employer/Employer’ Representative for notice of no objection.

1.6 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/Employer’ Representative. 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, detailed project report for phase 2, SOD of CMRL, 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, TVS, 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 Verband 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 from the above list with the approval of CMRL.

d) Unless otherwise stated, the E & M, TVS, VAC System designs 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

e) 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.

f) 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.

g) Should the DDC propose to use alternative Standards or Codes of Practice, they shall submit two copies of these with justification for their use to CMRL for review and acceptance within 2 weeks from the Issue of Letter of acceptance.

1.7 Property Development

Identification of Property Development area within the station structures and, submission of technical & financial viability report of the proposals excluding commercials. Consultant should explore the possibility of accommodating negative spaces of metro stations to accommodate with some abutting public structures or integrate the station building with adjacent properties as the case arise or civic infrastructure authorities allow to employ judicious and optimized value engineered solutions to satisfy various public and private stakeholders and additionally help obtain non-fare box revenue for CMRL. Consultant should produce architectural and structural design of Property Development area wherever required, including design of Building Services (MEP, fire Detection & suppression, Air Conditioning, water supply, sewerage etc. The Property development can be integrated with stations or stand alone.

1.8 Presentation Material, Working Models and Samples

The DDC shall provide the Employer/Employer’ Representative with information covered by this Design Lot for such purposes of presentation or display as Employer/Employer’ Representative may 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. 3-D walkthrough movie shall be provided at DD stage for typical UG and elevated stations.

1.9 Tender Documentation

The Employer/Employer’ Representative will prepare the Tender Documents. However, responsibility for preparing draft material for these documents in soft and hard copies shall be that of the DDC. 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/Employer’ Representative, 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) TVS/VAC and allied works (vi) Tables of vertical Circulation Equipment’s/ elements for stations, including escalators and lift numbers, types, landing, elevations, run and rise (vii) Tables of Automatic Fare collection (AFCs) Equipment for stations, including Automatic Ticket Machines (ATMs) and Automatic Ticket Gates (ATGs) etc.

The Tender drawings shall include Station Floor Plans for all levels, including all public and non-public areas, indicate vertical circulation elements, access and parking; load bearing and partition walls, fire separation walls, Automatic Fare Collection (AFC) equipment layouts, ancillary facilities and equipment rooms, facilities and spaces for station commercial trading functions, and any other required furniture, fixtures, and equipment, Station Sections and Elevations, keyed to the plans, including all major structural elements, vertical circulation elements, track-bed and drainage, MEP, provisions for secondary and tertiary building systems and elements, walls and ceilings, doors, windows and other significant openings, and general materials and finishes.

1.10 Amendments to Tender Documents (Pre-contract)

The DDC shall provide additional design and other information not included in the Tender Documents (Pre-contract) as may be required by the Employer/Employer’ Representative. 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.

1.11 Contract Drawings

The DDC shall submit to the Employer/Employer’ Representative, 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 et cetera during execution of works shall be the responsibility of DDC without any cost implications.

1.12 Geo-technical Investigations

The DDC shall study all subsurface and sub-soil data provided by CMRL which shall be used for design works.

1.13 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, the details from System contractors shall be provided by Employer/Employer’ Representative. However, DDC will also interface with other DDC’s / contractors for obtaining necessary inputs. The timings for issue of the CSDs, will be determined by the Employer/Employer’ Representative 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 SOD drawings and architectural/Structural drawings
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 designs with various system-wide Works as and when required by the Employer/Employer’ Representative. This shall be a continuous updating process in conjunction with design development extending towards the completion of the structural works. If discrepancies exist in the drawings it shall be brought to the notice of Employer/Employer’ Representative.

3. The DDC shall design the embedded items and include these works in the respective civil contracts as directed by the Employer/Employer’ Representative. The interface between the civil contractor’s work and the system-wide work shall be clearly defined.

4. DDC will interface with CMRL for ensuring the proper coordination in designing and development of the UG and elevated stations / viaduct/ tunnels and all other structures for the smooth running of metro system.

1.14 Liaison Work

The DDC shall assist Employer/Employer’ Representative by providing reports and drawings for approval and clearances from concerned local authorities.

1.15 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/Employer’ Representative).

1.16 Interaction with the Employer/ stakeholders

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

ii) 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.

1.17 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.
1.18 Deficiencies of services

i) 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 Date. This phase shall include the preparation and submission of:
   i. The Preliminary Design
   ii. The Definitive Design; and
   iii. The Construction Reference Drawings.
   iv. 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's Representative 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 propose rectification and repair methodology pertaining to structural works upon request from contractor/ Employer/ Employer’s representative and submit necessary additional designs, drawings and necessary technical documentation as required to the Employer/ Employer’s representative approval

1.8 SAFETY CERTIFICATION OF THE NETWORK 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 2 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 also comply with their instructions regarding rectifying any defects and making good any deficiencies. Design Basis Report for entire alignment with LDC 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 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
A detailed site plan is to be prepared showing contours based on levels taken at intervals of 25m, invert levels where necessary, and the extensions of any roads proposed is to be prepared. The detailed site plan shall include all necessary data relating to existing features like trees, public utility services, streets, pavements adjoining properties and boundaries. The site plan should also indicate the location of all proposed buildings and possible future extensions, landscaping areas, water bodies, etc.

2.3 Levels are to be with respect to GTS bench marks to be fixed by the consultant.

2.4 Before conducting the site survey, grid points at 25m intervals shall be fixed permanently at site with 150 x 150 x 900mm demarcation stones. Such stones shall be fixed 300 mm below the ground in the natural soil and remaining height shall be exposed above the ground and painted with yellow paint. Co-ordinate numbering shall be written with red paint as E/N (E represents Easting - coordinate, N represents Northing - coordinate from origin to be provided by CMRL upon written request)

2.5 A site plan showing the grid stones and their numbering shall be prepared and submitted to the Client.

2.6 Review 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.

2.7 Traffic surveys and analyse for design of traffic ingress/ egress and multi –modal traffic integration and design of efficient traffic inventories.

2.8 Area traffic management plans
The DDC shall develop a comprehensive Traffic Impact Assessment and Traffic Management Plan for the surrounding area of the alignment, taking into consideration the traffic generated because of the proposed station. However, the detailed traffic management plans during construction stage to facilitate the construction work will be made by works contractor, which will be reviewed and checked by DDC. The concept plan shall meet the standards required by the relevant authorities.

The DDC shall propose conceptual local traffic diversion routes and assess traffic impacts caused by the work during construction to ensure smooth traffic operations and safety of both construction workers and road users and after completion of works in the affected areas.

The DDC shall prepare BOQ for road diversion / other civil works required to be included in the civil contract based on the conceptual plan.

The DDC shall prepare and present its proposed Traffic management Plan for
presentation to Employer/Employer’s Representative, relevant authorities and City Agencies.

2.9 Traffic Management Guidelines
An integrated traffic management plan for the complete area shall be proposed with due consideration for each works contract. Widths for traffic on arterials affected by construction shall be consistent with those specified by the relevant authorities. Roadway designs, traffic management schemes, and installation of traffic control devices shall be in conformance with the requirements and regulations defined by the relevant authorities.

2.10 The DDC shall conduct topographical surveys. The DDC shall prepare a report on all survey work undertaken, including checks on mapping, survey stations, co-ordinates, setting out, etc. A report covering site investigation results and Geotechnical interpretation in sufficient detail shall be prepared and shall be submitted to Employer/Employer’s representative. Record all features of site existing prior to construction, likely to be disturbed.

2.11 Prepare GIR (Geotechnical interpretative report), PDA (Potential Damage Assessment), EBS (Existing Building survey), Instrumentation and monitoring plans and suggest mitigation measures, traffic management.

2.12 The DDC shall conduct topographical surveys, hydrological surveys, etc. 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. The DDC shall prepare a report on all survey works undertaken, including checks on mapping, survey stations, co-ordinates, setting out, etc. A report covering site investigation results in sufficient detail shall be submitted to Employer/Employer’s representative.
## 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 the existing Chennai Metro Rail Network, leading to the definition of requirements in consultation with the Employer's Representative 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 wayfinding, 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, fixtures 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, TVS/VAC)**

i. The DDC shall produce sufficient design options for all structures, systems and services covered in this contract. DDC shall also review the station locations including entry/exit structures and all ancillary buildings & develop designs considering adoptability of the design as per site conditions. The limits of land may undergo changes after final survey and the DDC shall make any adjustments necessary to the design to acknowledge the changes to the limits as defined. 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 system 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’s/stakeholders’.

ii. Each design alternative shall be presented in sufficient detail to clearly define the proposed design alternative including:

1. A description of the proposed design alternative and the comparative advantages and disadvantages of each.
2. Clearly illustrated sketches, drawings, diagrams, calculations, published reports, written description and other supporting documents for evaluating the proposal.
3. Concept schedule of materials and finishes
4. A detailed estimate of the amount of savings in construction/system cost.
5. 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)
6. Case studies, if any- National/ International in support of the alternative proposed
7. Passenger circulation model, horizontal and vertical circulation and passageway requirements.
8. Single line diagram of electrical system including panels and DB’s, cable sizing etc.
9. Wiring layout floor wise and external areas. This shall include location of DB’s, fixture sockets, lighting, fans, etc. and wiring details

iii. Upon agreeing to alternative design proposal, the DDC shall completely design and detail the Works, provide Tender and Contract Drawings and other documents for the works contract and be fully responsible for such design, dimensional control, and coordination with various disciplines and detailing.

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

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

(f) Station Planning Report

DDC shall submit a report for review and notice of Employer/ Employer’s representative specifying the basic characteristics of the station, highlighting them in the order of importance. The report shall include the specific characteristics of each station. The report shall also include, but not be limited to, the following:

i. A set of CAD 3 dimensional simulated photographs/views for each station showing platforms, concourse and various passenger handling elements of station.

ii. A computer simulated passenger flow module showing the peak flow, delayed and emergency conditions, for typical stations as decided by the Employer. The software shall be able to simulate level of service at platform, concourse staircases and in queuing areas showing passenger handling from the point of arrival of train on a platform to the next arrival and finally to the exit of station. It should be able to locate the critical areas of the station for expected overcrowding and conflicts in passenger flows.

iii. This software shall be a computer graphic presentation of the station planning done by the Contractor from the point of view of passenger handling and it shall be treated as a supplement to the design calculation.

iv. Acoustics report

v. Green Building Implementation Report

PRELIMINARY DESIGN STAGE:

(g) 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.

(h) 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.
(i) Preparation of preliminary architectural/structural/ MEP/ TVS & 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/ SCADA.

(j) 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.,

(k) Preliminary Traffic Management plan consisting of probable diversion routes, Suggested alternatives, Preliminary bus stop relocation plan etc.

(l) 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.

(m) 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. Automated Flood protection and design
   m. Advanced parking management including bicycle parking

(n) 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.

(o) The estimated quantities should not vary by more than +/- 10% from the executed quantities carried out as per the construction drawings.

(p) Drawings and Documents to be submitted incorporating:
   i. Property development in proposed stations area and financial viability report.
   ii. Infrastructure accommodating all necessary amenities.
   iii. Barrier Free Design implementation
| iv. | Passive design features. |
| v.  | Implementation of Green building concepts |
| vi. | Ecologically sustainable design, efficient use of energy and natural resources (like solar, wind etc.) |
| vii. | Waste management and recycling proposal. |
| viii. | Optimization of constructability, operability & maintenance. |
CHAPTER 4

SERVICES TO BE PERFORMED BY THE DDC PRIOR TO THE AWARD OF CONSTRUCTION CONTRACTS: DEFINITIVE DESIGN (BASIS OF DETAILED DESIGN)

4.1 Based on preliminary drawings the DDC shall prepare the definitive design (DD) documents consisting of plans, elevations (confirmed 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 test structural design against 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 the contract specifications 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 Employer/ Employer’s representatives review and also submit a monthly report in an approved format (duly approved by Employer), 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 produce Station Reflected Ceiling Plans, indicating layouts and integration of ceiling mounted services, structural and architectural elements, MEP...
equipment, environmental control systems, Tunnel Ventilation system, Ventilation and Air-Conditioning system, BMS-SCADA system wide components, and the like. The DDC shall establish energy conservation design criteria incorporating green building principles to prepare designs complying with reflectance, heat gain/loss requirements, passive control measures, natural ventilation, solar shading systems, green building concepts etc.

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

4.8 The DDC shall submit Calculations, Schedules and Tables Comprising:

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

4.9 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.

4.10 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.

4.11 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.

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

4.13 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.

4.14 Separate Definitive Design Submissions 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.

4.15 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 purpose of which is to illustrate all the Permanent Works and to be the drawings governing construction.

4.16 Passenger flow calculations for normal and emergency egress conditions, Subway Environmental Simulation Analysis and CFD Analysis for VAC (Ventilation & Air-conditioning) and TVS (Tunnel Ventilation) systems, Acoustical analysis shall be performed by DDC and reports shall be submitted to Employer/ Employer’s representative for review. Based on these approved reports of VAC & TVS systems the detailed design should be prepared.

4.17 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.

4.18 DDC shall prepare Architectural, structural, track alignment & design, Civil structure designs, MEP, Fire protection & suppression & Fire fighting, VAC, TVS designs and drawings with properly coordinated CSDs (Combined services drawings) for submission and review to the Employer/ Employer’s representative. 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.

4.19 The general arrangement of the stations, the equipment locations and services routes, and the cable routes are to be shown in the CSD drawings. The equipment loads, openings and embedded items and other similar interface are also to be shown on these drawings.

4.20 Road Restoration/ Site Reinstatement/ Traffic management Proposals/ Landscaping/ Multi-Modal Integration

Preparation of detailed designs of intermodal transfer facilities for road, rail and pedestrian traffic, landscaping and post-construction road/site-reinstatement implementation plans including road restoration, storm water drain, paver pattern/scheme, landscaping and planters design, design of street furniture, signage, ramps
and footpaths for commuters, street lights and medians with landscaping etc. wherever required for smooth traffic movement and submission to the local authorities for approval. Requirements of green building certification should be submitted along with plans for review by CMRL along with suggested measures related to Sustainable site, water conservations, energy efficiency, materials conservation, air quality management and innovative points pertaining to reinstatement.

4.21 **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. 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 by CMRL.
- d. quality assurance and quality control (QA/QC) plan,
- e. reinstatement/ rehabilitation plan,
- f. Work programme etc.
- g. Building and Services Plan as per applicable standards & Employer’s/stakeholders’ requirements.
- h. 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.
- i. Preparation of Drawings and Detailed Estimate of all works/packages for the project.
- j. Approval/clearance of the Building Plan and Services by Local/Statutory Authorities (if required) before start of execution of works.
- k. Detailed design, considering load data, Noise and Vibrations of equipment, 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

4.22 **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;
- b. Electrical substations and associated high voltage and traction power supply systems;
- c. Electrical underground conduit banks within CMRL right-of-way;
- d. TVS/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), and SCADA systems;
- i. Traction power, power supply and emergency power supply equipment;
- j. Automatic fare collection system;
- k. Lifts and escalators;
I. Signage and Advertising
   m. PSD in UG stations

4.23 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.

4.24 It is the Consultant’s responsibility to proactively approach and coordinate with SWC to address any requirement in the designs and drawings pertaining to passenger health, safety, environment, security, serviceability of structures which may adversely impact the safety and security of passengers without any claim whatsoever to CMRL at any stage of this contract. DDC shall immediately raise a notice and flag any such undesirable consequences routed through CMRL for such modifications at any stage.

4.25 The general arrangement of the stations, the major equipment locations and major services routes, and the cable routes are to be shown on the CSD drawings. 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 coordinate 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.

4.26 The layouts of the station and 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.

4.27 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
(Basis of Detailed Design- for preparation of Schedule of Dimensions, Structural Electrical Mechanical & Combined Services Drawings):

5.1 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 and programme logic 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

h) Station, tunnel, viaduct and depot structures

i) Foot over bridge under-bridges, culverts;

j) Detailed and typical sections;

k) Initial Traffic Management Plans and report for approval from authorities before commencement of works and review of contractor's traffic management plans

l) Earthwork cross sections;

m) Line side and security fencing;

n) Escalators and Lifts;

o) Fire Fighting Arrangements;

p) Drainage plans (for Stations, Tunnel, Viaduct, depot and track etc.);

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

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

s) Platform Screen Doors for UG stations

t) Road Restoration & Reinstatement plans with landscape, public furniture and fixtures reinstatements and MMI.

u) 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).
v) The DDC shall co-ordinate its design with the relevant agencies and Interfacing contractors to develop their design and drawings.
w) The initial vertical and horizontal alignment of the relevant stretch inclusive of its geometrics will be provided by Employer/Employer’ Representative in soft copies. DDC should review the alignment considering site constraints geological & geotechnical conditions, resettlement & rehabilitation proposals etc. and submit a revised alignment drawings along with soil lithological profiles to Employer/Employer’ Representative for notice of no objection.
x) Particular attention shall be paid to locations where flooding could enter station or tunnel areas. 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. Entrances and all other points of access to the station and tunnel areas shall be adequately protected against flooding.
   iii. Equipment rooms and pits for lifts, escalators and other facilities shall be adequately protected against flooding.

5.2 Conceptual drawings for Viaduct, special bridge (if any, cross-over, long spans) elevated ramp to underground, elevated and underground stations and their other structures including embankments etc as applicable for particular DDC package.
   a. Conceptual interface studies for system integration, cable routing etc for stations.
   b. Conceptual Interface studies for stations
   c. Preliminary planning with tentative production rates
   d. Estimation of preliminary quantities per structure type
   e. Identification of land acquisition (if required) for temporary and permanent structures
   f. Justification of the proposed construction methodology: launching gantry for elevated viaduct, type of retaining structures for deep excavations, etc.

5.3 The key aspects covered by the DDC will be:
   • Reference standards;
   • Design Basis Report
   • Design Criteria;
   • Interpretation of the geotechnical and hydrogeological investigations;
   • 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;
   • Construction method and construction sequence;
   • Applied load cases and design assumptions;
   • methods of analysis, which have to be appropriate and valid;
   • geotechnical and structural design of the temporary and permanent works;
• ultimate and service design capacities of all components;
• Fabrication Drawings for all Steel Structure works
• Proof checking of temporary works (including scaffolding, shuttering details etc.) to facilitate the construction of permanent works.
• overall stability of the structures in both the short and long term conditions;
• water tightness requirements and proposed technical solutions;
• construction and reinforcement details;
• design of the mitigation measures;
• suitability of the design to the construction methodology adopted by the Contractor;
• integrity of structural member and structures as a whole;
• constructability;
• Interface drawings civil works / M&E equipment.

5.4 The following deliverables will be prepared for Underground Structures, Stations & Tunnel:

a. Structure designs, drawings, method statement, construction methodology of the following structures –

b. Underground Stations by Cut & Cover (Top-Down or Bottom Up Sequence) or NATM or any other method of construction.

c. Tunnels by Cut & Cover or NATM or Bored tunnel with segmental lining.

d. Cross-passages and Subway by Cut & Cover or NATM or Box-Pushing or any other method.

e. All the Ancillary structures (including water tank) above or underground associated with the stations and tunnels, Boundary wall.

f. Launching/retrieved shafts, thrust frame for TBM, TBM lowering crane foundation stability and method statement

g. Any shaft built for ventilation purpose or to accommodate the construction requirements (like evacuation of TBM on breakdown) at any location along the alignment.

h. Tunnel walkway, sumps

i. Other underground structures associated with the corridor

j. All the temporary structures associated with the construction of above structures. Temporary Construction will include soil stabilization, soil support through strut, waller, anchoring(soil or rock) arrangement, secant piling, diaphragm walling, sheet piling etc.

k. Prepratation of Geotechnical Interpretation Report based on Soil investigation report.

l. All temporary structures, enabling works like form work, staging, construction scheme, lifting plans etc. shall also be checked by the DDC
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.

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.

### 5.5 Scope of Services for Track works

The Scope of Services consists of preparation and submission of the following design calculations & documentation and drawings following design specifications and appropriate standards.

#### Detailed Design of Track Alignment :
- Detailed geometric alignment as plan and profile drawings for the whole stretch.

#### Ballastless Track Design :
- Documents (DBR & DCN) of track in elevated, at grade and underground section with MSS or without MSS.
- Preliminary and detailed design drawings.
- Interfacing with other systems engineers for a holistic design approach
- RSI study, which is required to propose measures to mitigate horizontal movement. RSI Study shall be proposed for the entire stretch.

#### Technical reports (Ballastless track)
- Use of CWR in the lowest identified radius in mainline.

#### Technical reports (Depot track)
- Documents of track at grade for embedded track and special tracks in depot including inspection bay, pit track, washing track, access ramps and transition slab. (DBR & DCN)
- Preliminary and detailed design drawings.
- Co-ordination with systems engineer to have a holistic approach in design

#### Regarding Track Accessories, the followings shall be submitted:
- Acceptable tolerances.
- Review of supplier design documents.
- CWR (International codes will be followed for designing).
- Requirements for earthing, bonding and corrosion protection.

#### Preparation of Tender Documents in track design for all mainline and depot track that will include the followings :
- BOQ for track in both mainline and depot.
- Special Technical Specifications, requirements specific for this tender in track work for mainline and depot.
- Special conditions of contract, in case any deviation from General Condition of Contract is to be updated for specific purposes of the tender.

#### Cost Estimates will be prepared for track work in both mainline and depot.

#### Quality Control Plan shall be submitted.

#### Regarding Construction drawings, the followings shall be submitted in stages :
- Concept Drawing
- Preliminary Drawings for approval
- Construction Reference Drawings
- Good for Construction Drawings

#### Interface requirement and site meetings.

#### All designs and drawings produced in scope of works will be proof checked by lead design checker (LDC).

#### Review and issuance of design conformity certificate of As-built drawings.
5.6 Functional requirement of Permanent and Temporary Drainage (Water supply, Drainage and Disposal)

The DDC shall design and detail permanent drainage of the Works including the connections of these to the existing drainage systems located outside CMRL perimeter. The drainage systems to be detailed as part of the design shall include but not be limited to:

a. Sumps and pumps inside any building or structures, whether above ground or below ground, for the collection of water other than foul sewerage;

b. Drainage systems inside and outside any building or structure for the conveyance from the sump(s) or other collection points to the appropriate sewer or drain of the drainage authority; Strom water drainage management. Metro rail Tunnel flood defence system. Flood defence systems would need to be integrated at certain points along the Metro Tunnel alignment.

c. Systems for the surface water drainage of reinstated roadways, landscaped areas, car parks and other paved areas associated with the works and for the conveyance of the surface water to the appropriate drainage system of the relevant drainage authority; and

d. Drainage systems for the conveyance of water from CMRL track, to discharge points acceptable to the appropriate drainage authority.

5.7 Co-ordination with Utility Services

1. The DDC shall provide utility required for depot, all stations, and ancillary buildings, tunnels, via-duct, etc. to include but not be limited to:

a. Sewerage;
b. Provisions for future installation of all utilities;
c. Fresh water supply;
d. Electrical ducts;
e. Fire protection and detection systems;

5.8 Traffic Management Plan & Report:

A presentation of the preliminary traffic management plan will be given to meet the required schedule of connected activities. As a minimum the report shall contain:

a) Probable diversion routes,
b) Roadway requirement during construction
c) Station influence area
d) Suggested alternatives,
e) Preliminary bus stop relocation plan
f) Pedestrian considerations
g) Major utility lines to be relocated
h) Decking plans and arrangements

The preparation of detailed Traffic Management Plan for station and circulating area to finalise the street level reinstatement and landscaping shall be the responsibility of the DDC.
5.9 Potential Damage Assessment (PDA), Existing Building Survey and mitigation measures, Instrumentation and monitoring plans with LDC certificate.
6.1 Functional requirement of Architectural Design

The Architectural services shall include the detailed design of all Architectural and landscaping works if any, review the land requirement for stations, preparation of drawings specifications, cost estimates and other documents, as required, in order to prepare tenders and to construct the Works, together with such other services as are set out and referred to in this contract. The Works also include assisting Employer/Employer’ Representative in obtaining the necessary approvals from concerned Authorities.

The DDC shall submit a Design Brief describing in words, diagrams and graphics, and the Architectural Objectives. This Design Brief should take into account the following considerations:

a. The stations should be designed to allow for maximum natural air flow through the concourse and platform areas in elevated stretches.

b. There should be optimized approach for space planning and themes to be followed for designing underground stations.

c. The detailing of every element within the station area is important, not only for visual and aesthetic reasons but to ensure that materials are durable and can easily be maintained.

d. Station boarding/alighting and the resulting entry/exit location requirements.

e. The integration and co-ordination of the architectural finishes with the structure and MEP fittings and services is required.

f. Firefighting systems.

g. Multi-Modal integration. Provision of links to existing parking facilities; subways, adjoining properties and foot bridges.

h. Signage and Wayfinding.

The DDC shall prepare drawings with sufficient detail to fully describe the architectural design of the stations, tunnels, viaduct, depot and ancillary facilities, in addition to property development premises including MEP & Building Services and any structures visible to the public. These drawings shall address at a minimum such balance issues as:

i. Station and ancillary buildings architectural design;

ii. Site design, landscape design and urban design;

iii. In conjunction with the existing site characteristics which are to remain including heritage structures;

iv. Pedestrian paths and vehicular links;

v. Interfaces with proposed and potential future development projects;

vi. Environmental considerations including flood control;

vii. Hierarchies of public and private spaces;

viii. General concepts of building massing;

ix. Integration with existing and proposed property development; and
x. Floor and ceiling finishes having good light dispersing properties to enhance illumination.

xi. Cost effective, construction friendly, green concepts to be incorporated in internal and external finishes of all structure and holistic approach shall be insured.

The DDC shall prepare design solutions responding to requirements for public and private transportation facilities. The DDC shall prepare all the designs and drawings keeping in view the prevailing building rules.

The DDC shall identify and incorporate public transport and traffic engineering design requirements related to stations, ancillary facilities and property development.

The DDC shall collect and analyse the flood data from the relevant authorities and propose solutions for flood control at interfaces and thresholds between proposed grade levels and stations and ancillary facilities. As a thumb rule, the Entry podiums of the stations shall be designed based upon the highest level among HFL+0.45 (Highest flood level observed in last 100 years)/ existing (proposed) road median level + 0.45/ existing (proposed) footpath level+0.45.

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 UG 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. All Handicapped facilities (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:

- **Site work**: Granite Kerbs, Concrete Kerbs, Natural Stone Pavers, Brick Pavers, Concrete Block Pavers and Grass-Concrete Pavers.
- **Concrete**: Concrete Floor Surface Treatments; Precast Concrete Architectural Panels; Glass Reinforced Cement Panels.
- **Masonry**: Mortar, Grout and accessories for Granite or Other Stone; Mortar Grout and 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.
- **Metals**: Vitreous Enamelled Steel Panels; Barriers and Railings; Drain Grates and Manhole Covers.
- **Thermal and Moisture Protection**: Sealants
- **Doors and Windows**: Entrances and Storefronts; Hollow Metal Doors and Frames; Rolling Grilles; Glass and Glazing.
- **Finishes**: Paver Tile; Wall Tile; Metal Ceilings.
- **Specialities**: Toilet Partitions and Accessories; Equipment Cabinets; Graphics and Signage; Ashtray and Litter Bins; Telephone Enclosures; Booths and Workstations.
- **Mechanical Work**: Plumbing Fixtures and Trim.
- **Electrical**: Lighting, power, air conditioning and water pumping.
- **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.

The design of the station to be safe in the event of a fire/emergency is of utmost concern. In this respect it is essential that the suitable necessary details are incorporated into the design as per prevalent rules, regulations, code and practice. Durability of all station elements is important and as such the following considerations shall be incorporated into the design:

- Corrosion protection is required for all exposed and hidden metallic elements
- Precautions must be taken to prevent bimetallic corrosion
- The choice of finishes shall take into account durability and ease of maintenance, safety, fire resistance, and cost, replace ability, aesthetic considerations, etc.

6.2 **Functional requirement of Green Building design & Certification**

DDC shall prepare compliance report for each station and suggest measures related to Sustainable site, water conservation, energy efficiency, materials conservation, air quality management and innovative points pertaining to their design to obtain “Platinum”...
level certification compulsorily. CMRL is following “IGBC Metro Systems” for achieving green building implementation in our metro systems. Measures for rain water harvesting, harnessing renewable energy resources of nature, mitigation of heat island effect etc. should be clearly spelt out before preparation of tender documents and materials, methodologies and technologies should be proposed in prior for review by CMRL.

6.3 **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. Periodic inspection and data evaluation of works at site

6.4 **Functional Requirement of design for Safety and Security**

(1) **Introduction**

The objective is to minimize the potential impact on passengers and minimize dependence on technology and equipment when formulating security and safety plans for each facility. Issues may include, but not be limited to, the following:

(a) Station perimeter - definition of separation between station operating area and any adjacent structures.  
(b) Appropriate features to support life, safety and security strategy.  
(c) Conformance with appropriate fire and life safety codes  
(d) Provisions regarding sufficient areas and means of egress to facilitate safe movement of passengers and staff at peak times, disrupted conditions and/or emergencies.  
(e) Provisions regarding maintaining tenable conditions during tunnel and station evacuation in the event of an emergency  
(f) Provision of fire detection and alarm systems including fire detection systems, HPI, and audible & visible alarms and SCADA for monitoring from the OCC.  
(g) Provision of fire detection and suppression systems (both underground and above ground)  
(h) Access control systems  
(i) Central security control, monitoring and response  
(j) Provision of water hydrants for fire safety in stations and tunnels.

(2) **Safety Management Methods**
Safety in the rail transit industry involves:
(a) Hazard Identification and Management
(b) Quantitative Risk Assessment (QRA)
(c) Design Review
(d) Traceability from Initial Design to Acceptance Testing (Safety Certification)
(e) A Separate Safety Management and Reporting Function
(f) Training of station staff in assessment and management of emergency conditions.

(3) Security
The station operating area and site which comprises the ingress and egress to the station needs to be identified as a separate distinct area within the overall station complex. Safety and security provisions shall be included in the design to address all sections of the separation of the station operating area from the remainder of the station complex and any non-station structure directly adjacent to station operating area.

(4) Station Site Perimeter Security
The boundary of the station operating area is typically at the street level where access is provided, and is determined by the separation of the station operating area from any adjacent structures. This shall be defined as the Station Perimeter. Security provisions for the Station Perimeter shall be as follows:
(a) Station Entrance Protection – All station entrances and pedestrian access ways that are adjacent to vehicular pathways must be provided with vehicular barriers and high security screens that can be closed and secured.
(b) Pedestrian access – All pedestrian access either from the street or other exterior areas/sections of the station complex shall be designed as to permit barrier separation from the station operating area in the event of an emergency.

(5) Path of Pedestrian Travel
Security provisions are required at each part of the passenger’s movement through the station. The following are the features required at each juncture.
(a) Station Entrance – provide adequate station information signage in such a way as to not result in passenger queuing at entrances.
(b) Paid Area – provide in each access point to paid area, infrastructure provisions for at least one of the entrance gates to each access point in the direct area of passenger travel (not segregated into separate area) with the following:
   • Body scan machine, (by others); and
   • Luggage scanning machine (i.e. x-ray scanner on conveyor), by others.
(c) Entrance to paid area is to be configured so as to permit the operation of this security point without impact on the movement of passengers at the other entrance gates.

(6) Awareness and Training strategies
Public and station staff awareness of the security provisions and requirements of the station’s operation is essential in maintaining a viable security program in large and
dynamic public facilities like a station.

Suggest Awareness Program – Development and implementation of a public safety awareness campaign for staff and passengers at each station regarding the safety requirements and features of the new stations; and

Suggest Training Program – Development and implementation of safety training plan that includes drills and the monitoring and response to life safety emergency conditions.

(7) Emergency Preparedness

Dynamic temporary threats from non-traditional sources also need to be incorporated into the stations emergency response plan. The approach to handling them begins with the definition of the potential threat and the critical assets (e.g. people, operational facilities) whose protection is necessitated by the threat. This is essentially a planning process that produces an emergency response plan. In some cases the analysis may result in physical infrastructure adjustments. However, it depends primarily on the physical protection in place from the traditional safety protocols and features such as fire/life safety and an operational strategy that will effectively mitigate the threat. Critical steps in this analysis and planning are:

(a) Threat assessment
(b) Evaluation of Asset vulnerability
(c) Assessment of existing safety and security capability both in physical plant and in existing operations (e.g. available staff at station, police and fire department response capabilities)
(d) Implementation of additional protocols and physical features to address threat operationally and at physical plant.
(e) Development of an operational emergency response plan that
   - Incorporates and coordinates existing response capabilities (police and fire) and provides for additional ones (e.g. chemical, Biological)
   - establishes new security procedures and protocols (e.g. training, ongoing planning and review by staff)
   - Define specific response roles for response group and population affected by threat during potential incident

As part of the planning and design process, the Contractor shall develop a security plan that addresses the static and dynamic security concerns identified by the metro system in conjunction with the Municipality for the station and is responsive to the operational requirements of Metro Authority and any other government agency having jurisdiction over the facility. Below is a diagram that highlights this process for a transit system.

*Figure - Security and Emergency Preparedness Planning Guide*
(8) Mobility Impaired
Areas of refuge will be required on each level that the mobility impaired have access to. They shall be as follows:
(a) Areas of refuge for the mobility impaired shall be provided within the protected emergency egress staircase enclosure that permits supervised evacuation.
(b) Two-way communication systems by means of help-point intercom (HPI) in refuge areas.
(c) Additional equipment such as evacuation chairs, to be provided to assist emergency personnel.
(d) Tactile Braille signage complying with Handicap requirements shall be located at each door to an area of refuge.

(9) Concessions
For the purpose of establishing fire safety requirements, Concessions shall be classified based on size and use. Small concessions are generally portable. Separated space with rolled down closure stands is generally applied to a fixed concession. Fire rated enclosures are generally required where the concession is a large area along the wall, adjacent to other ancillary rooms within the station requiring fire separation. Concession areas could be designed using concepts of compartmentation, separation and limitation of fire loads or localized extract.

(10) Management and Maintenance
The maintenance and testing of the station fire safety systems is a key factor in
maintaining the tenability of the emergency capabilities of the station. Heavily used public facilities such as train station require that an effective maintenance program be developed and implemented to assure viability of equipment and controls. In conjunction with the maintenance, an ongoing training program also must be in place that keeps key station staff current on the management of the various systems that make up the fire and life safety protection for the station.

(11) Design
All electronic safety and security systems must be designed with provisions to facilitate maintenance of the systems. This requires that they have supervisory wiring and adequate monitoring and control. This ensures that every device can be individually tracked to determined status of operation and available power. In addition, in the event that a device fails it should not affect the remainder of the system and repairs and or replacement can be effected expeditiously.

(12) Maintenance
Protocols for the cleaning, repairs and replacement need to be established. It should ensure, adequacy of stock for all fire and life safety systems, detailed regular reporting on conditions of critical systems and identification of staff and outside vendor resources required to keep system in an acceptable state of repair. Automated maintenance monitoring systems that are part of overall station maintenance should incorporate these requirements.

6.5 Functional requirement of Urban Planning

a. The Site Plans should be prepared based on the urban planning design standards carried out in coherence with specific land acquisition plans which have been submitted to the Government of Tamil Nadu State and to the Ministry of Railways for railway land, for approval. The Consultant must therefore develop his layouts to suit the available land provided for the metro works.

b. Submissions for planning approval for underground, ground and above ground metro works are to be made by the Consultant to all statutory bodies as applicable.

c. The Consultant shall submit applications for permanent connections for utility services i.e. sewerage and drainage and water supplies to the Chennai Metropolitan Water Supply and Sewerage Board.

d. Fire clearance applications shall be made by the Consultant to Tamil Nadu Fire and Rescue Services.

e. In addition a number of agencies are involved in the reinstatement works, permanent road accesses, temporary road accesses, refuse collection accesses, street lighting, traffic management and fire hydrant positions. The Consultant is responsible for obtaining the approvals for these other works.

f. The Consultant is responsible for obtaining the approval of applications from the relevant Authorities for the design of works. The Employer will provide all possible assistance in trying to obtain any permission.

Multi-modal integration scheme, Final Restoration plans including traffic restoration and management, landscaping, street scaping, public fixtures and furniture etc.
CHAPTER 7

7.1 Functional requirement of E & M, Plumbing Works

The MEP services shall include the detailed design of all building accommodation and architectural interfaces with MEP services in the civil structures. The scope of DDC includes the provision of cable duct/trenches for the 33 kV cable looped in and out at the ASS. The route includes the trench/conduit planned to carry 33/11 kV cable from viaduct to the electric substation. Otherwise for lighting in circulation area, only 415/420 V power distribution is planned. Air conditioning requirements need to be planned individually for each station and in depot buildings based on Employer/ Employer’ Representative’s requirements. The scope shall include the preparation of drawings, layouts, specifications, erection/mounting details, interface with the system-wide contractor or arising out of concurrent works, cost estimates and other documents, as required. This shall include the incorporation of architectural co-ordination requirements with the requirements of other disciplines for the following services:

1. Provision for lifts & escalators;
2. MEP 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. Signalling and communications;
9. Signage;
10. Stand-by generator;
11. Uninterruptible power supply system (UPS) for lighting loads;
12. Earthing and bonding;
13. Lightning protection;
14. Power factor correction at major loads; linear; short switching non-linear
15. Fire Prevention, Fire detection, Fire protection, Fire suppression for passenger amenities/commercial development/advertisements inside the stations as per latest NFPA 130 guidelines/ NBC code & local fire authorities; Fire Compartmentation drawings
16. Smoke Management report for all structures;
17. Water services; pumps and automatic control;
18. Drainage, plumbing and sewerage;
19. Lifting equipment at plant rooms;
20. Lighting calculations, Lighting power distribution for parking areas, circulation area, station face lighting;
21. Provision of cable ducts, cable ways or trenches for all the cables including in coming 33 kV supply cable or cables supplied by all interfacing contractors.
22. LT distribution and fire prevention measures for passenger amenities/commercial development/advertisements inside station.
23. Building Management system
24. TVS & VAC requirements
25. Lighting calculations for different buildings, civil structures, tunnels, stations, viaduct, cut and cover ramp etc. as applicable.
26. PABX system
27. Electrical & communication cable layout drawings,
28. Typical installation drawings
29. Conduit layout drawings;
30. Mode tables and other required logics for automation.
31. Mounting details of lighting fixtures and other fittings,
32. Load calculations for internal electrification, DB/ SDB details of different circuits for lighting fixtures, fans, exhaust fans, sockets, HVAC etc.,
33. Cable sizing details, cable schedule.
34. 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 in Laboratory.
35. Power generation through solar panels and use of energy efficient fixtures.
36. 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.
37. Access Control System & CCTV system, Local Area Networking
38. Any other requirements as applicable to comply with applicable norms of concerned authorities

All individual components should be readily accessible for maintenance and repair.

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.

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.

7.2 Low voltage (LVSGR, Low side equipment) Requirement: Design report, Low voltage power balance calculation note, Main switch board schematic diagram, Lighting schematic diagrams, 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…), Schematic diagrams, Main switch board schematic diagram, Distribution boards schematic diagrams.

7.3 For the underground stations the following systems will be defined:
Environmental Control System (Ventilation and air-conditioning);
Fire Fighting System;
Fire Detection/ suppression System;
Emergency Power Back up;
Plumbing System;
Low voltage;
SCADA Systems;
Escalators & Elevators.

For each of the sub-systems above, schematics diagrams (air flow schematics, LV distribution single line diagram…) will be submitted for approvals.
The Detail Design Consultant will prepare design reports and preliminary calculation notes. It will mainly include (non exhaustive list):

Station heat loads & tunnel heat load.
Station required cooling capacity for both summer and monsoon outside conditions
Tunnel ventilation required airflow for normal and emergency modes (fire and congestion).
Electrical loads
Water consumption and requirements for tanks

Great attention will be paid on interfaces with other and especially civil work by defining main requirements from building services (openings in intermediate slabs).

On the basis of the above, preliminary BOQ and Equipment Schedule will be developed by the Detail Design Consultant and submitted as part of the Preliminary Design.

### 7.4 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 Tenderer 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, Tunnels, cross-passage etc.

f) Designing, Sizing and Layout of Earthing and Lighting 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.),

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) SCADA System for UG stations

r) VESDA system

s) The DDC shall prepare Testing, Commissioning and acceptance Criterion.

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

(d) Determination of Quantities and Preparation of BOQ, etc.

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

(f) 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.

(g) 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.

(h) Prepare comprehensive cost estimate for the works and Bill of Quantities (BOQs) for E & M Contracts separately for tendering by CMRL, if required.

(i) 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.

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

(k) 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.

(I) DDC shall verify Bill of Quantities of each Schedule before issuance of Tender Documents and also confirm to CMRL that all items of works have been incorporated in the BOQ documents. The Quantities of various item should be carefully worked out and if found that the variations with respect to execution drawings is more than 5% then a lump sum compensation may be deducted at 10% of the total fee. Decision of the CMRL Engineer, shall be final and binding on the consultant.

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 Trucking / Feeder Cables as required.
- Design of Power factor & Harmonics study for the LV side Power Network.
- Design of UPS feeding all Emergency loads.
- Design of DG sets for feeding all Emergency, Essential and Semi Essential loads.
- Design of Interlocks and Protection Schemes for Power distribution, suiting to the desired operation, duly co-operated with high voltage side protections and protection of the individual equipment.
- Design of normal and emergency lighting arrangement & lighting control system automatic operation in Station areas, tunnel, 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, etc.
- Design of Earthing System comprising of earth mats, earth electrodes and Main earth Bus in Auxiliary Sub Stations, Clean Earth System and bus, earthing arrangement in tunnels.
- Design of Control and small power supplies to various station equipment/ Panel.
- Design of Lightning Protection System
- Design of tie bus Cables / Bus Trucking System for connection between ASS.
- Design of SCADA system for E&M services of UG stations;

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 at Station Control Room and OCC through BMS /
SCADA


- Designing of “Dynamic reactive power compensator”.

The Electrical and Mechanical services shall include the detailed design of all E & M services in the stations, and ancillary buildings. The scope of DDC is limited to low voltage only except for the provision of cable duct/ trenches for the 33 kV cable looped in and out at the ASS. The route includes the trench/ conduit planned to carry 33/11 kV cable from viaduct to the electric substation. Otherwise for lighting in the circulation area, only 415/420 V power distributions are planned. Air conditioning is planned only at few selected office/ equipment rooms. The criteria shall cover these specific areas only. The scope shall include the preparation of drawings, layouts, specifications, erection/ mounting details, interface with the system wide contractor or arising out of concurrent works, cost estimates and other documents, as required. The substation or pump rooms shall have provision for a beam & chain pulley block for lifting of equipment for maintenance/ installation handling. Provision shall normally include unloading/ loading of material on to or from the maintenance vehicle. This shall include the incorporation of architectural co-ordination requirements with the requirements of other disciplines and the detailed design of the following services:

  Structural and facilities for lifts & escalators;

  E&M support provisions;

  Low voltage distribution;

  Normal lighting;

  Emergency lighting connected to UPS backed by DG set and normal supply;

  Essential lighting backed by DG set supply;

  General purpose power;

  Signage;

  Stand-by generator;

  Uninterruptible power supply system (UPS) for lighting loads;

  Earthing and bonding;

  Lightning protection;
Power factor correction at major loads; linear; short switching non-linear
Power supplies for other contracts;
Fire detection;
Fire protection;
Water services; pumps and automatic control;
Drainage, plumbing and sewerage;
Lifting equipment at plant rooms;
Public telephone facility; (local calls, STD, ISD in Booths only)
Lighting power distribution for parking areas, circulation area, station face lighting;
Provision of cable ducts, cable ways or trenches for all the cables including in coming 33 kV supply cable or cables supplied by all contractors.

7.5 **Electrical**

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 Trucking / Feeder Cables as required.
- Design of UPS feeding all Emergency loads.
- Design of DG sets for feeding all Emergency, Essential and Semi Essential loads.
- Design of Interlocks and Protection Schemes for Power distribution, suiting to the desired operation, duly co-operated with high voltage side protections and protection of the individual equipment.
- Design of normal and emergency lighting arrangement, lighting control system & automatic operation in Station areas, tunnel, cable galleries, parking areas, solar lighting, solar provisions, sub way connecting entry/exit and other room. This includes external cabling and provision of lighting fixtures with lamps, ballast, control gear, etc.
- Design of Earthing System comprising of earth mats, earth electrodes and Main earth Bus in Auxiliary Sub Stations, Clean Earth System and bus, earthing arrangement in tunnels.
- Design of Control and small power supplies to various station equipment/ Panel.
- Design of Lightning Protection System
- Design of tie bus Cables / Bus Trucking System for connection between ASS.
### 7.6 Fire Detection and Suppression

Design of complete Fire Detection & Alarm system including monitoring and control through a Fire Alarm Panel at Station Control Room and OCC through BMS / SCADA.

Designs of Fire suppression system in all Elevated Station Building / other structures including Hydrants, Hose Reels, Sprinklers System, Fire Hose Cabinets, Portable Extinguishers, Gas Based Flooding System, pipe line network with control valves for sprinklers and hydrants.

### 7.7 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.

### 7.8 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:

#### 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 or 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 items 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 a rain or storm event rain water falls on building roofs, parking lots, and green spaces. In northern climates snow or ice falls on a site in the same places. The water from the rain or snow is collected in the storm water system. The question of what to do with this water is becoming a debated topic and requires different approaches in different locations. The traditional way to manage storm water was to remove it from the building and site as quickly as possible. In some growing communities this approach resulted in devastating results by creating flooding and contaminating fresh water supplies downstream of the buildings. Options on methods to handle storm water should be discussed early in the design process.
CHAPTER 8

8.1 Functional requirement of Ventilation and Air-conditioning systems

(General principles and applicable code for emergency ventilation system in stations and tunnel section climatic conditions to be used for the design. Design basis for HVAC system in stations - Performance requirements, inside conditions to be achieved Overall principle for fire safety Integration of various systems)

a) The detailed design, layout, supply, installation and commissioning of Environmental Control System (ECS) including system sizing shall be undertaken by the consultant. The Environmental Control System shall include, as a minimum, the air-conditioning of station public areas, non-public areas, system rooms and other designated rooms; mechanical ventilation of plant rooms, toilets, stores etc., smoke control and extraction system in stations.
b) The Consultant shall be design plant rooms, plinths, supports, anchors, delivery routes, system cable containment, power supplies, drainage connections and other provisions necessary for the installation of the Ventilation and Air Conditioning systems and associated systems, by Interfacing Contractor(s).
c) It will be required in basement parking facilities and commercial/ office spaces. There are certain areas where require special Air conditioning.
d) Preparation of technical specifications of the system with capacity calculation along with basis for calculations. Optimised design considering maximize natural ventilation provisions should be studied and submitted for preliminary assessment and approval by Employer/ Employer’s representative.
e) Preparation of technical particulars of each component of the system indicating their material of construction.
f) Heat load calculation for summer and winter.
g) Layout of each building showing the location of each components of the system.
h) Ducting layout and plant room layout, AHU & ducting size calculations.
i) Preparation of SLD, scheme General Arrangement drawing for the electrical panel, control desk and specification of electrical equipment.
j) Blank data sheets of components, system to be filled by vendors.
k) Any other Buildings/ services as directed by engineer in-charge.

8.2 Design Drawings (Preliminary/ Detailed Design);

- Tender Drawings for Environmental Control System (ECS), Tunnel Ventilation System (TVS) and Building Management System (BMS);
- Layout of the ECS & TVS Plant Rooms;
- Ducting & Piping Layout;
- Detailed designs for Air-conditioning Scheme, Smoke Management, Tunnel Ventilation, Ventilation of Plant Rooms and Auxiliary areas, Stand by Air-conditioning for certain Plant Rooms and Electrical requirement for ECS and TVS Works along with layout;
- Electrical Load Schedules after interfacing with other Departments of CMRL / System
Group, Other designers / Contractors;

- Design of Electrical system for VAC works including panels, cables etc.
- Layout for Cable/Wire containment system (trays, ladders, conduit etc).
- General arrangements and layout Drawings for Panels, PLCs and other necessary equipment etc.
- Testing, Commissioning and acceptance Criterion.
- Prepare separately plans, Section, detailed designs, definitive design drawings and documents, BOQ and specifications in sufficient detail for the construction by construction contractors under ‘construct only’ contracts for:
  - Ventilation and Air conditioning system including smoke management for station
  - Tunnel ventilation system
- The design for station VAC system and tunnel ventilation system shall be based on the results of the Subway Environmental Simulation analysis using SES (Ver. 4.1) program, which will be performed by CMRL and results shall be provided to DDC. CFD analysis, if required, shall be performed by the DDC.
- Produced detailed combined services drawings (CSDs) and provide structural electrical/Mechanical drawings (SEM) showing all openings for ECS and Tunnel Ventilation System.
- Provide a comprehensive cost estimate for the works and bill of quantities for the construction contract, for each item of works.
- Provide a design program updated at monthly intervals.
- Provide design support during the construction to review the work for compliance with the design and to carry out design changes required during construction to review the CRDs submitted by the contractor.
- The consultant shall be available for any clarifications to the intending bidders, either through a pre bid conference organised by the Employer or otherwise, on the drawings/designs/schedule of items prepared by them.
- The consultant shall verify bill of quantities of each schedule before issuance of tender documents and also confirm to CMRL that all items of works have been incorporated in the BOQ documents.
- Calculations: -
  - The relevant calculations including soft copies of software/spreadsheets to the design
shall be submitted for the review with respective design submissions.

- The DDC prepare and submit a comprehensive set of calculations for the pre-final and final design in a form acceptable to the employer.

**General Requirements**

8.3 The objective of the Underground stations Ventilation and Air conditioning System shall provide a comfortable and safe environment for the passengers and station staffs during normal operating conditions.

8.4 During fire / emergency conditions, the station VAC system shall provide smoke extraction from the station. An effective means of controlling smoke flows during emergency conditions such that both passengers and station staffs could evacuate safely and also to ensure that fire-fighting personnel could reach the incident location without traversing a smoke-filled path.

8.5 During fire conditions, VAC system shall interface with the fire protection system for shut down of the appropriate VAC equipment and operation of smoke control system through the SCADA system mode table operation.

8.6 VAC system shall include the following functions:

a) Station Air-conditioning System for public area, operation and office rooms.

b) Station Ventilation system

c) Station Smoke management system for safety of the passengers and station staffs. Also, pressurization of firemen and fire escape stairs in case of fire / emergency conditions.

d) Electrical power supply and distribution system from MDB / EMDB to all VAC equipments.

e) VAC SCADA system for control and monitoring of complete underground stations Ventilation and Air Conditioning System.

f) Interface with Civil and other systems

8.7 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 underground metro stations to design complete underground 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.

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

**Design Criteria for Air Conditioning System**

8.9 Outside Design Conditions

It is based on 2% criteria for summer and 1% criteria for monsoon/evaporation from ASHRAE Standard.

Summer: 36.2 °C Dry Bulb (DB), 25.8 °C Wet Bulb

Monsoon: 32.3 °C Dry Bulb (DB), 28 °C Wet Bulb

8.10 Inside Design Conditions for Concourse and platform Public area 26 +/-1°C Dry Bulb (DB), 55-60% RH

8.11 Internal Load: Occupant Load and Lighting load

8.12 Occupancy Criteria according to contract and global / international practice are as follows:

8.13 Minimum Fresh Air Ventilation
The air conditioning for different areas of the station box is summarized as follows:

**Table-1 (Internal Design Conditions for Rooms)**

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>ROOM NAME</th>
<th>ROOM TAG NO.</th>
<th>Design Temp °C</th>
<th>Relative Humidity, %</th>
<th>No. of persons</th>
<th>Equipment Heat Dissipation load (KW)</th>
<th>Air Conditioning</th>
<th>Gas extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Station Control Room</td>
<td>A-01</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>4</td>
<td>3.7</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>Communication Equipment Room</td>
<td>C-03</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>1</td>
<td>5.5</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Signalling Room</td>
<td>C-01</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>1</td>
<td>0.5</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>UPS Room</td>
<td>P-03</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>-</td>
<td>10.5</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Excess Fare, Ticket office &amp; Secure Suite</td>
<td>A-02.1, A-03.1 &amp; A-04.1</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>4</td>
<td>4.5</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Excess Fare, Ticket office &amp; Secure Suite</td>
<td>A-02.2 &amp; A-03.2</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>4</td>
<td>3.3</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Secure Suite</td>
<td>A-04.2</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>-</td>
<td>0.5 per Ticket Vending Machine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Locker Male</td>
<td>O-10M</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>2</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>Locker Female</td>
<td>O-10F</td>
<td>22+/−2</td>
<td>50+/−7</td>
<td>2</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Note:

a) Station rooms will be served by dedicated Variable refrigerant Flow (VRF) indoor and outdoor units during revenue and non-revenue hours.

b) During non-revenue hour’s air conditioning shall be served to Station control room, Communication equipment room, Signalling equipment room and UPS battery room.

c) Dedicated duct and ceiling suspended ventilation exhaust fan shall be proposed for the UPS battery room. This fan will be interlinked with Hydrogen gas sensor to maintain the allowable limits of hydrogen gas concentration. There is no requirement of fire rated duct and fan as it will operate to exhaust the hydrogen gas.

d) VRV/ VRF outdoor unit shall be proposed with fully inverter type Scroll compressor.

e) All air conditioned room will be maintained at positive pressure with respect to surrounding environment.

f) Spot cooling will be done using grill / diffuser of supply air ducts of public areas AHU in security screening areas of short & medium entrances.

g) Fresh air shall be provided in the back up house air conditioning rooms from AHUs.

h) Fresh air in public areas (Concourse & Platform) will be supplied by fresh air fans. This fresh air will mix with return air and then enter the air handling unit (AHU with VFD). Fresh air fan will be proposed with variable frequency drive (VFD).

i) Exhaust duct and grill with motorized damper will be provided to extract gas after flooding of fire suppression system. This exhaust duct will be connected with smoke extract / return air fan of public area. Normally motorized damper will be closed and it will be opened after flooding of fire suppression system to extract the residual gas from the room.

8.16 PD (Property Development) area Design Criteria
Inside Design Condition  \( 24 +/\!-\! 1 \degree C \) Dry Bulb (DB), 55 +/-5% RH
Outdoor air minimum requirement: 6 l/s per person.
If PD area is more than 100 Sq.m then smoke purging system shall be considered.

8.17 Station smoke control / Management System
The design of the system shall be complied with SFSRTS and NFPA 130 whichever is stringent. The baggage fire load in the station shall be considered with 2 MW. Smoke control shall be provided for the station public area, BOH corridor and long entrances.

8.18 Staircase Pressurization
For Staircase Pressurization System, Supply fan shall be proposed to pressurize the Fire Escape Staircase & Fire Man Staircase in case of fire mode for safe egress of passengers. These staircases will be pressurized by 50 Pa in accordance with NBC 2005. Pressure relief damper shall also be provided. If pressure in staircase will increase with permissible limit,
pressure relief damper will open automatically to release the pressure.

8.19 **Design Criteria for Station Ventilation System**

All toilets shall be provided with exhaust air system. Replacement / makeup air shall be done by fresh air Duct through fresh air fan.

The mechanical ventilation for different areas in the station box and ancillary building is summarised as follows:

**Table-2 (Station Ventilation Design Criteria)**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Room Name</th>
<th>Room Tag No.</th>
<th>ACPH</th>
<th>Ventilation Supply</th>
<th>Ventilation Exhaust</th>
<th>Gas Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Natural</td>
<td>Mechanical</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>TVS Panel Room</td>
<td>M-11.1</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>DB Room</td>
<td>P-09.1</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Fire Men Store</td>
<td>O-25</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pump Room</td>
<td>M-02</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tunnel Ventilation Fan Room</td>
<td>M-13.1</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Long Corridor / Subway</td>
<td>O-01.1</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>TVS Panel Room</td>
<td>M-11.2</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>DB Room</td>
<td>P-09.2</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9</td>
<td>Pump Room</td>
<td>M-02</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Toilet Male</td>
<td>O-08M, O-08M.1</td>
<td>18</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Toilet Female</td>
<td>O-08F, O-08F.1, O-08F.2</td>
<td>18</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Toilet for differentially abled</td>
<td>O-09</td>
<td>18</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Janitor's Room</td>
<td>O-11</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Waste Water Pump Room</td>
<td>M-03</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Tunnel Ventilation Fan Room</td>
<td>M-13.2</td>
<td>6</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Long Corridor / Subway</td>
<td>O-01.2</td>
<td>10</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
### Scope of works

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>DB Room</td>
<td>P-09.1</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>18</td>
<td>Sewage &amp; Drainage Water Pump Room</td>
<td>M-04</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>19</td>
<td>Telecommunication Closet</td>
<td>C-08.1</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>20</td>
<td>DB Room</td>
<td>P-09.2</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>21</td>
<td>Sewage &amp; Drainage Water Pump Room</td>
<td>M-04</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>22</td>
<td>VAC Equipment Room</td>
<td>M-09.1</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>23</td>
<td>VAC Equipment Room</td>
<td>M-09.2</td>
<td>10</td>
<td>✓</td>
</tr>
<tr>
<td>25</td>
<td>MVSGR &amp; 33KV Transformer Room &amp; LVSGR</td>
<td>P-01, P-02 &amp; P-05</td>
<td>10 or Heat dissipation from equipment whichever is higher</td>
<td>✓</td>
</tr>
<tr>
<td>26</td>
<td>Undercroft area ventilation</td>
<td>-</td>
<td>4</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Note:**

- a) Dedicated duct and ceiling suspended ventilation exhaust fan shall be proposed for the Toilet rooms.

- b) Gas suppression rooms: Exhaust duct and grill with motorized damper will be provided to extract gas after flooding of fire suppression system. This exhaust duct will be connected with smoke extract / return air fan of public area. Normally motorized damper will be closed and it will be opened after flooding of fire suppression system based on the mode table operations.

- c) Exhaust ventilation fan is proposed in Switch gear rooms & transformer room of ancillary building and same exhaust duct, grill and the same fan will be used to extract gas after flooding of fire suppression system. Make up air will come naturally through louvers. This exhaust fan will be interlinked with fire alarm panel. When fire suppression system will be activated then exhaust fan to be closed. After completing of fire suppression, exhaust fan will be switched on manually to take out gas and smoke from the panel and transformer room.

- d) Long entrances (more than 60 m in length) will be proposed with dedicated exhaust fan. This fan will be installed in fan room and are connected with ducts & grille. Also, exhaust fans will be 100 % working & 100% Standby to safe egress of passengers in emergency / fire mode operation. Makeup / replacement air will come through entry /exit entrances.

- e) All fans shall be operated based on temperature controlled system except toilet exhaust fan and UPS battery room fan.
### 8.20 Noise Criteria

The maximum allowed noise / sound pressure levels apply to every position within a room at a height of 1.5 m from the floor and not closer than 1.5 m from any air outlet or equipment.

**Table 1: Noise Criteria**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Location</th>
<th>Maximum sound pressure level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Station concourse and platform public areas (with PSDs open during normal operation)</td>
<td>55 dBA</td>
</tr>
<tr>
<td>2</td>
<td>Station concourse and platform public areas during fire / emergency conditions with the platform screen doors open condition</td>
<td>75 dBA</td>
</tr>
<tr>
<td>3</td>
<td>External (To boundary of nearest property / building or 10 metres from the vent shaft louvers whichever is the nearest location during normal operation of stations, normal and congestion operation of tunnel ventilation system)</td>
<td>60 dBA</td>
</tr>
<tr>
<td>4</td>
<td>External (To boundary of nearest property / building or 10 metres from the vent shaft louvers whichever is the nearest location during emergency operations of both station and tunnel ventilation system)</td>
<td>No criterion for emergency operation</td>
</tr>
<tr>
<td>5</td>
<td>Fireman/ Fir escape staircase</td>
<td>65 dBA</td>
</tr>
<tr>
<td>6</td>
<td>Fire Pump rooms, Waste water pump room, Sewage &amp; drainage water pump room, Mechanical (VAC) equipment room, Ventilation fan room, Chiller plant room, Cooling tower area.</td>
<td>85 dBA</td>
</tr>
<tr>
<td>7</td>
<td>VRF outdoor unit area</td>
<td>65 dBA</td>
</tr>
<tr>
<td>8</td>
<td>MVSGR, LVSGR and Transformer room.</td>
<td>75 dBA</td>
</tr>
<tr>
<td>10</td>
<td>All other ventilation rooms</td>
<td>65 dBA</td>
</tr>
<tr>
<td>11</td>
<td>Entrances</td>
<td>55 dBA</td>
</tr>
<tr>
<td>12</td>
<td>All AC rooms/offices</td>
<td>55 dBA</td>
</tr>
</tbody>
</table>

### 8.21 Ductwork

- Duct velocity: Maximum velocity: 10.2 m/s for all ducts in normal application.
- Frictional pressure drop: 0.81 Pa / Meter for all ducts.

### 8.22 Ventilation Shaft louver Design Criteria

- Maximum Face velocity in Intake Louver: 2 m/s
- Maximum Face velocity in exhaust Louver: 2.5 m/s

DDC to liaise with Civil / architect team to optimise the size of the vent shaft size and height.

### 8.23 Smoke Zoning & Fire Compartmentation
Smoke zoning and fire compartmentation shall be coordinated with civil / architect team as per architectural drawing. Fire damper (FD) and Motorised smoke & fire damper shall be provided in VAC drawings based on smoke zoning and fire compartmentation drawings.

8.24 Air Curtains
Air curtains shall be provided at station entrances to prevent conditioned air from concourse public area to entrances.

8.25 Control & Monitoring of Indoor Air Quality (IAQ)
AHU shall be provided with pre filter (EU-4) and bag filter (EU-7) as per EN 779, UVGI emitter & drift eliminator.
CO₂ shall be monitored continuously in the public area. CO₂ ppm level shall be monitored and controlled using CO₂ gas sensors. This fresh air fan will be considered with VFD to vary speed of fan when occupancies of public areas vary.

8.26 Energy Efficiency Measures
DDC shall propose the energy efficiency measures and to get the IGBC platinum rating Criteria considering the latest technology as per IGBC (MRTS)/ ASHRAE 90.1-2010/ ECBC-2007 etc.,

8.27 Computational Fluid Dynamics (CFD)
CFD analysis shall be performed by DDC to meet environmental tenability criteria as per NFPA 130.
CFD modeling shall be carried out to demonstrate that the proposed smoke management system is capable to maintain tenable condition for safe egress of patrons in the event of concourse public area fire, platform public area fire and train fire at station platform.

8.28 3D Modelling
DDC shall engage 3D modeling specialist for the VAC system to avoid clash between VAC services. The same shall be coordinated with Civil / Architect and other system teams during combined services drawings (CSD) and Reflected ceiling plan (RCP) drawings to avoid clash between VAC services and other services.

8.29 RAMS and EMC analysis
DDC should engage the RAMS and EMC specialist for the station VAC System to design and select the best VAC equipment including electrical and SCADA system as per the relevant standard to meet the requirements of RAMS and EMC.

8.30 Testing, Adjusting & Balancing
DDC shall consider the requirements of NEBB (National Environmental Balancing Bureau) standard during the detailed design for optimal performance of the station.

8.31 Station VAC System
The platform and Concourse public areas will be air-conditioned using air handling units located in the VAC plant rooms at Concourse Level.

**Normal Mode:**
Platform and concourse public areas are air-conditioned through Air Handling Units (AHU) which is located at VAC plant room (M-09.1 & M-09.2) in both ends of stations. Supply air grilles are connected to insulated supply ducts of AHUs for the proper distribution of conditioned air in platform and concourse level. Return air grilles are proposed to take return air from these areas via return air duct. These return air ducts are connected to RAF/SEF (Return air fan/ Smoke extract fan). Return air will enter through these fans and mix with fresh air in return air plenum of AHUs. MSD (Motorized smoke damper) are considered in various locations in layout to control the air flow in normal and emergency
mode application.

Station concourse and platform public area will be served by dedicated Variable refrigerant volume (VRF) outdoor units with Air handling units (AHU). Air handling units shall be provided with Direct Expansion (DX) coils which is suitable for VRF units. Refrigerant (410A) pipe in and pipe out temperatures and temperature sensor located in the return air duct, will be used to control inside design temperature by using Electronic Expansion valve kit and Control / communication kit. VRF unit compressor speed will be modulated based on the signal from EEV opening positions. The AHU and return air fans shall be provided with VFD.

Station air conditioning rooms will be served by dedicated Variable refrigerant volume (VRF) outdoor units with indoor units. Room remote control / thermostat will be located at suitable positions around the conditioned areas to monitor the room temperature. Refrigerant (410A) pipe in and pipe out temperatures and return air temperature sensor located in the indoor unit, will be used to control inside design temperature by using Electronic Expansion valve kit. VRF unit compressor speed will be modulated based on the signal from EEV opening positions.

**Free Cooling mode:**

Free cooling / ventilation mode shall be considered for concourse and platform public area.

**Emergency Mode:**

Return air duct will work as smoke extract duct and will be fire rated. AHUs and VRF units will be shut down when fire occurs either on concourse or platform or technical rooms and all MSDs of supply air duct will be in closed position. Smoke will be extracted to the ventilation exhaust shaft to the ambient through smoke extract/return air duct and RAF/SEF. Make up air will come through entry /exit of stations.

**8.32 Standards & codes:**

<table>
<thead>
<tr>
<th>ISHRAE</th>
<th>Handbook Indian Society of Heating, Refrigerating and Air-Conditioning Engineers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECBC</td>
<td>Energy Conservation Building Code</td>
</tr>
<tr>
<td>NBC</td>
<td>National Building Code of India</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association (USA)</td>
</tr>
<tr>
<td>ASHRAE</td>
<td>Handbook American Society of Heating, Refrigerating and Air-Conditioning Engineers</td>
</tr>
<tr>
<td>ASHRAE 62.1</td>
<td>Ventilation for acceptable indoor air quality</td>
</tr>
<tr>
<td>ASHRAE 90.1</td>
<td>Energy Standard for Building Except low rise residential Building</td>
</tr>
<tr>
<td>NFPA 130</td>
<td>Standard for fixed Guide way transit and passenger Rail System</td>
</tr>
<tr>
<td>NFPA 204</td>
<td>Standard for smoke and heat venting</td>
</tr>
<tr>
<td>SFSRTS</td>
<td>Standard for Fire Safety in Rapid Transit Systems</td>
</tr>
<tr>
<td>IGBC</td>
<td>Indian Green Building Council</td>
</tr>
<tr>
<td>HVCA</td>
<td>Heating and Ventilation Contractors Association</td>
</tr>
<tr>
<td>DW/144</td>
<td>Specification for Sheet Metal Ductwork Low, Medium and High Pressure or Velocity Air Systems</td>
</tr>
<tr>
<td>IS 277</td>
<td>Galvanized Steel Sheet (Plain and corrugated)</td>
</tr>
<tr>
<td>AHRI</td>
<td>Air-Conditioning, Heating and Refrigeration Institute</td>
</tr>
<tr>
<td>AHRI-410</td>
<td>Forced-Circulation Air-Cooling and Air-Heating Coils</td>
</tr>
<tr>
<td>AHRI 1230</td>
<td>Performance rating of VRF Multi split Air-Conditioning &amp; Heat pump equipment</td>
</tr>
<tr>
<td>BS</td>
<td>British Standards</td>
</tr>
<tr>
<td>CIBSE</td>
<td>Chartered Institution of Building Service Engineers</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrical Commission</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standards Organization</td>
</tr>
<tr>
<td>SEDH</td>
<td>Subway Environmental Design Handbook</td>
</tr>
<tr>
<td>BS 476</td>
<td>Fire tests on building materials and structures.</td>
</tr>
<tr>
<td>NFPA 90 A</td>
<td>Standard for the Installation of Air-Conditioning and Ventilating Systems</td>
</tr>
<tr>
<td>EN 12101-6</td>
<td>Smoke and heat control systems. Specification for pressure differential systems. Kits</td>
</tr>
<tr>
<td>EN 13053</td>
<td>AHU-Rating and performance for units, components and sections</td>
</tr>
<tr>
<td>EN 1886</td>
<td>AHU – Mechanical performance.</td>
</tr>
<tr>
<td>EN 799</td>
<td>Particulate air filters for general ventilation. Determination of the filtration performance</td>
</tr>
<tr>
<td>UL 555</td>
<td>Standard for Fire Dampers</td>
</tr>
<tr>
<td>UL 555S</td>
<td>Standard for Smoke Dampers</td>
</tr>
<tr>
<td>AMCA</td>
<td>Air Movement and Control Association USA</td>
</tr>
<tr>
<td>AMCA 204</td>
<td>Balance Quality and Vibration Levels for Fans</td>
</tr>
<tr>
<td>AMCA 210-07</td>
<td>Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating</td>
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<td>AMCA 210-99</td>
<td>Laboratory Methods of Testing Fans for Aerodynamic Performance Rating</td>
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<tr>
<td>AMCA 300-08</td>
<td>Reverberant Room Method for Sound Testing of Fans</td>
</tr>
<tr>
<td>EN 61000</td>
<td>Electromagnetic Compatibility</td>
</tr>
<tr>
<td>EN 50121-1</td>
<td>Railway Applications – Electromagnetic Compatibility Part 1: General</td>
</tr>
<tr>
<td>EN 50121-2</td>
<td>Railway Applications – Electromagnetic Compatibility Part 2: Emission of the Whole Railway System to the outside world</td>
</tr>
<tr>
<td>EN 50121-4</td>
<td>Emission and Immunity of the signaling and Telecommunication Apparatus</td>
</tr>
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<td>EN 50121-5</td>
<td>Emission and Immunity of Fixed Power Supply Installations and Apparatus</td>
</tr>
<tr>
<td>EN 50122-1</td>
<td>Railway applications: fixed installations; protective provisions relating to electrical safety and earthing</td>
</tr>
<tr>
<td>EN 50122-2</td>
<td>Railway applications: fixed installations; protective provisions against the effects of stray currents caused by D.C. traction systems</td>
</tr>
<tr>
<td>EN 50204</td>
<td>Radiated Electromagnetic Field from Digital Radio Telephones Immunity Test</td>
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<tr>
<td>EN 50126</td>
<td>Railway applications. The specification and demonstration of reliability, availability, maintainability and safety (RAMS)</td>
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<tr>
<td>Mil-HDBK-470A</td>
<td>Designing and developing maintainable products and systems</td>
</tr>
<tr>
<td>IEC 61124</td>
<td>Reliability testing – Compliance tests for constant failure rate and constant failure intensity</td>
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</tbody>
</table>
IEC 62278  Railway applications – Specification and demonstration of reliability, availability, maintainability and safety (RAMS)

EN 50128  Railway Applications - Communications, Signalling and Processing Systems - Software for Railway Control and Protection Systems

EN 50129  Railway applications – Communication, signalling and processing systems. Safety related electronic systems for signalling

BS5760  Reliability of Constructed or Manufactured Products, Systems, Equipments and Components

EN 50178  Electronic equipment for use in power installations

EN 55011-2007  Industrial, scientific and medical (ISM) radio-frequency Equipment. Electromagnetic disturbance characteristics. Limits and methods of measurement

IEEE  Institute of Electrical and Electronic Engineers

IEC 60034  Rotating Electrical Machines.

IEC 60072  Dimensions and Output Series for Rotating Electrical Machines.

All standards and code shall refer to latest editions. DDC shall submit the hard copy and soft copy of the standard shall be used for the design.

8.33 Any other Crucial Details / Experience earned from Present Phase-1

1. Variable refrigerant flow (VRF) unit is proposed instead of water cooled chiller system considering the following:

   a. To eliminate usage of water in system due to water scarcity in Chennai.
   b. Energy efficient system especially in part loads.
   c. Space requirement is less and there is no requirement of closed room for VRF outdoor units. Hence, capital cost of system is less.
   d. Installation is very simple and hence reduces the overall project installation time.
   e. Ocean black fin (Black Coating – Corrosion resistant, Hydrophilic coating – minimizes moisture buildup on the fin) is recommended for the fins and the same the shall be included in the tender specifications to increase life of the VRF outdoor units. In addition, the canopy / covering for the VRF units is proposed to avoid direct sun light and rain on the VRF outdoor units in order to enhance the life of the unit.

2. Vent shaft height and size shall be optimized and the same shall be included in the civil scope.

3. CSD and RCP drawings: Sequence of all activities shall be included by DDC to avoid damage and rework.

4. VRF outdoor units:

   The following works shall be considered in the civil scope.

   a. VRF shaft shall be extended in the street level to take all VAC services in order to avoid ingress of rain water from street level to concourse level.
   b. Stainless steel 316 ladder shall be considered for access to VRF outdoor units.
   c. Stainless steel 316 fencing shall be considered for VRF outdoor units for the safety of the O&M personnel.
   d. Water tap and drain point shall be provided near the VRF outdoor units to clean the condenser coils.

8.34 Design basis report including VAC schematic drawings for Air side and VRF refrigerant system, Electrical SLD and SCADA architecture. DDC shall be co-ordinated with Civil and other systems to provide the inputs to CSD and RCP to avoid clash between the services.
CHAPTER 9

9.1 Functional requirement of Tunnel Ventilation systems:

a) DDC shall study passenger Flow calculations for normal, congested and emergency conditions using subway environmental simulation analysis (1 D) and 3-D CFD Analysis of TVS systems. DDC shall optimize the TVS design suitable for Chennai conditions.

b) 3D Computational Fluid Dynamics (CFD) Analysis and 1-Dimensional analysis for all stations and tunnels to meet NFPA 130 (latest) requirements for tunnel ventilation system. The DDC shall also conduct value engineering studies for optimizing tunnel ventilation system capex and opex costs.

9.2 Codes and Standards

i. Unless otherwise stated, the safety and TVS system design shall be governed by all applicable local codes, regulations and standards.

ii. In addition to local requirements, environmental control system designs shall also comply with the following codes of practice, standards, specifications and manuals.

iii. In case of contradiction between standards or this specifications, contractor to take approval from Employer's Representative (ER).

iv. NFPA 130: Latest Edition - Fixed Guideway Transit Systems: any non-compliance shall be approved in writing by the CMRL.

v. British Standards or other internationally recognised standards as approved by the Employer's Representative.

vi. Ventilation and air conditioning systems for stations and tunnels are to be based on the current "Handbook" series published by the American Society of Heating, Refrigeration and Air Conditioning and the "Subway Environmental Design Handbook" published under the sponsorship of the United States Department of Transportation, Urban Mass Transportation Administration.

vii. Licensed copy of all codes and standards shall be submitted in English language. The design of any one system shall be to a single code or specification. The parallel use of different codes for particular items or components shall not be allowed.

viii. In addition to local requirements, tunnel ventilation system design shall also comply with the following latest codes of practice, standards, specifications and manuals:

   a. U.S. Department of Transportation: Subway Environmental Design Handbook (SEDH)

9.3 **Functional Requirements:**

In normal mode, simulations shall be run for the evaluation of aerodynamic and thermodynamic behaviour of the tunnel ventilation network:

a. Air temperatures and velocities shall be calculated inside the tunnels for a typical summer day and for the design outdoor condition in summer. Those calculations shall demonstrate that the concept design proposed by the contractor is in accordance with allowable temperature in tunnels. The DDC to obtain the necessary data for the development of Tunnel environmental simulations so that this work shall be accurately performed. Train piston effects, heat load, air flow through ventilation shall be considered in the simulations.

b. Short term and long term heat sink phenomena shall also be considered during those investigations. For this issue, specific studies shall be performed to determine and evaluate the appropriate strategy for cooling the tunnels at night all along the year in order to benefit efficient heat sink effects during the day especially in summer.

c. For the trackway exhaust system (TES) three dimensional (3D) Computational Fluid Dynamic (CFD) simulations shall be performed to demonstrate that the system proposed meet the performance requirements.

d. In congested mode, models shall be run to demonstrate that the mass flow rate capacity of fans proposed by the contractor allows maintaining tunnel air temperature at the desired condition. Three dimensional (3D) Computational Fluid Dynamic (CFD) simulations shall be performed for an accurate estimation of temperature field in the vicinity air conditioning condensing units and along the path of egress to evaluate thermal conditions if evacuation is required.

e. In emergency mode, simulations shall be run with the ventilation network software to verify that the TVS proposed by the contractor matches functional requirements in case of train fire for each tunnel section including inter-stations, cross-overs and station trackways. In addition, 3D CFD simulations shall be performed for typical fire scenarios in tunnel including fire growth and time response of ventilation systems to evaluate smoke behavior, thermal and toxicity levels of smoke along the pass of egress. Those calculations shall be coupled with evacuation simulations to be performed by the contractor including Fractional Effective Dose (FED) calculations as prescribed in NFPA 130.

9.4 The DDC shall seek employer’s approvals for Design assumptions and simulations input data.

a. In normal mode:
   
   I. hourly average heat gain,
   II. hourly average air temperatures and air flow rates in tunnels and in ventilation shafts,
   III. estimation of heat sink effects through the walls and the surrounding soil along the year including effects of cooling tunnels at night,
   IV. residual pressure induced by piston effects and TVF along PSD
   V. Temperature fields along the station trackway determined by the CFD simulations of the TES.

b. In congested mode, the required fresh air volume flow rate and time evolution of air temperature along a congested tunnel.

c. In emergency mode, longitudinal flow velocities in tunnel in fire and in adjacent tunnels and fan flow rates for all emergency scenarios.
d. TVF, TEF and Egress shaft pressurized fan capacities (flow rate, fan diameter and shaft power)

e. Tunnel ventilation shaft resistance for draught relief and fan operation

f. For all fans and silencers, acoustic calculations to demonstrate that the sound pressure level does not exceed the noise criteria specified in performance requirement

g. Size of technical rooms and Tunnel ventilation shafts for interfacing with civil contracts

h. Control & Monitoring Architecture

i. TVS functional description. This functional description shall include ventilation control philosophy for each operating mode. For all scenarios using mechanical ventilation, the functional description shall briefly detail if needed the regulation principles that will be integrated in the ventilation control & monitoring system for the adjustment of tunnel fans flow rates to match velocity requirements in tunnels.

j. TVS schematic drawings, TVS typical technical room drawings

In addition, DDC shall provide SES (or equivalent software) simulations focused on a typical station with the surrounding tunnels in order to evaluate the infiltration flow rate between the tunnels and the station when opening PSD during dwell time.

9.5 **TVS Performance Design criteria**

The TVS shall be designed for three modes of operations:

a. Normal operation: since the trains are operating to timetable throughout the system at prescribed headways and dwell times within given tolerances. The headway shall be 2‘30” with 6 cars trains.

b. Congested operation: whenever operational problems or delays disrupt the scheduled movement of trains. As a result of congested condition, one or more trains may become stationary in tunnel segments or station trackways for extended period of time.

c. Emergency operation: result from any of the occurrences, such as transit vehicle malfunction, derailment or train fire in tunnel or station trackway. The response to an emergency may require patron evacuation under environmental conditions.

9.6 The design outdoor conditions in normal and congested mode shall be based upon the following criteria:

a. In summer: 38.0 °C for the Dry Bulb temperature / 25.2°C for the Wet Bulb temperature

b. In monsoon: 31.4°C for the Dry Bulb temperature / 27.5°C for the Wet Bulb temperature

c. Typical temperature along the year shall per as per latest ASHRAE guideline for Chennai city.

9.7 For the design, a sinusoidal shape shall be considered for the temperature variation along a day by considering that the peak temperature is generally reached at 2 pm.

9.8 In normal mode, the TVS shall be designed to maintain a maximum dry bulb temperature of 40°C inside the tunnels. To achieve this objective, the average wall surface temperature in a tunnel shall never exceed 38°C. Shall be considered as the wall surface temperature the average temperature of the first 55 mm thickness of concrete all along the tunnel. This
temperature criterion shall be strictly considered for the design of the ventilation mode used for cooling tunnel at night.

9.9 In congested mode, the TVS shall be designed to maintain a maximum dry bulb temperature of 45°C inside the tunnels.

9.10 In emergency mode (fire), the TVS system shall be designed to meet the following criteria:
   a. The total heat release rate for a train fire shall be 15 MW. A radiant fraction of 30% shall be considered.
   b. The emergency TVS system shall be in accordance with NFPA 130.
   c. Number of trains per ventilation section shall be as per the section length and signalling configuration.

9.11 **Shaft for TVS**

Air intake and exhaust shafts shall be provided for TVS. DDC shall design the tunnel ventilation shaft with minimum pressure drop (preferably not more than 900Pa)

   a) Shaft terminations shall be arranged to prevent smoke re-circulation between exhaust and air intake shafts. If not possible, emergency ventilation scenarios shall be built in order to avoid the use of a air intake shafts in the vicinity of the smoke exhaust shaft.

   b) Air velocities at shaft terminations shall be in accordance with other VAC shaft terminations and local environmental conditions.

   c) The TVS shaft inside surface shall have a quality surface finish to reduce the friction losses. The shafts are to be provided with minimum turns and bends and change in cross section area to avoid pressure drop. Airfoils shall be used if necessary to meet the performance requirements.

   d) The projections of TVS intake and exhaust shafts above ground level should match with the urban environment around and designed so as not to cause inconvenience to the public and the residents. Consequently, the size of the TVS duct within the kiosk shall be optimized to reduce as much as possible the architectural impact when it is required.

   e) For getting above mentioned requirements, the Contractor shall interface with Station and Tunnel Contractor.

9.12 Draught relief shafts as described in section 5 are one of the main key structures that allow self-ventilation of tunnels with the train piston effects. The following minimum requirements shall be followed:

   a. The size of TVS ducts along the draught relief shafts within the station box shall be as big as possible (25 m² recommended)

   b. The global aerodynamic resistance of draught relief shafts from the tunnel opening to outdoor opening shall be lower than 0.025 m².

   c. If the resistance is above this value, the contractor shall demonstrate that the performance requirements are achieved on temperature conditions in tunnels without any significant impact on ventilation strategy and energy consumption for cooling tunnels at night.

9.13 The size of TVS ducts used only in case of mechanical ventilation shall be maximised to reduce pressure losses and energy consumption on the TVS fans.

9.14 For the track exhaust system, the velocity in UPE and OTE concrete ducts shall be limited to 7 m/s. This shall be limited to 10 m/s in the metal ducts.

9.15 2.5 m/s for the louvers face velocity at shaft termination shall be maintained.
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/ Employer’s Representative, 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, MEP, VAC, TVS, Tracks works etc.

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

10.3 The DDC shall assist the Employer/Employer’s representative 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 produced by the Contractor, showing the locations, sizes and details of all of the Contractor’s equipment, cable containment, pipes, etc. These drawings are to be used to enable all equipment, pipes, cables, etc. to be installed without conflict and to enable future changes or modifications to be performed without impacting the existing installation.

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 Employer/ Employer’s Representative 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/plinths, 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 the details of the Drawings, they must include plans sections and elevations as required to clearly illustrate the compatible relationship between the different disciplines. Specifically, the drawings will include wall elevation drawings at 1:50 scale (or larger where required) indicating all openings, access panels, reinforcement zones, embedded and cast-in items and the like, and shall be submitted to the Employer/ Employer's Representative 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, builders bund walls and the like.
   b. placing and fixing of holding down bolts, lifting beams and hooks and other supporting items;
   c. supply, fabrication installation, protection, fixing and finishing of supporting steelwork, for equipment and associated accessories;
   d. casting in of edgings, angles in recesses, ducts, conduit, pipes etc;
   e. fixing equipment and associated, brackets, cable containment and fixtures;
   f. forming of penetrations, sleeves, access panels, holes, chases, recesses, openings;
   g. all in accordance with the Contract.

10.19 The CSD/SEMs shall also be used for the purpose of co-ordinating with the Interfacing Contractors and shall be continuously updated to reflect the latest interface co-ordination. Copies of the CSD/SEM drawings shall be included in submittals to the Employer/ Employer’s Representative.

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 to the Employer. All proposed solutions shall be issued to the Employer/ Employer’s
Representative 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/ Employer's Representative, 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/Employer's Representative 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, VAC/TVS etc.) 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/ Employer's Representative in preparation of, the construction cost estimate for depot, each station and ancillary buildings, tunnel section, viaduct section and allied works, etc. 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.

The Employer/ Employer's Representative shall review design drawings and Bill of Quantities from the prepared drawings. The DDC shall revise the Bill of Quantities as required by the Employer/ Employer's Representative and modifies the Cost Estimate accordingly.

### 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 best value for money bidding, and prepare final draft of tender documents, it is to be noted that separate tender packages for civil, MEP, Systems, Tracks, VAC/TVS 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 is awarded. The BOQs, specifications, cost estimate, etc. are to be prepared separately for individual stations, viaduct sections, tunnel sections and depot so as to facilitate Employer/Employer’s Representative 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 and instruct necessary correction to furnish the final draft to Employer/ Employer’s Representative for uploading of tender documents. The Consultant’s contract team should be present in CMRL as and when required for smooth liaisoning 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.
## 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/Employer’s representative 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. The Employer/Employer’s Representative will then issue the drawings to the contractor for construction of the Works. 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 from the contractor/ Employer and Employer’s Representative) 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. Furthermore the DDC shall assess, and report to the Employer/Employer’ Representative 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:

The DDC shall visit the site to provide his expert opinion on the design related issues of the Works and to report to Employer/Employer’ Representative, their observations and issue the revised drawings if required with necessary modifications and certificates. The result of such visits shall be reported to the Employer/Employer’ Representative immediately, if urgent actions are required.
### 12.4 Site Meetings

DDC shall attend site meetings as and when required by the Employer/ Employer’s representative, during the design stage and construction phase.

### 12.5 Monthly Progress Meetings

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

1. 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;
2. 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/Employer’ Representative).

### 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.

1. 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.
2. 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).

### 12.7 Maintenance report

A report complete 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 (or CD-ROMs). The reports can include:

- Inception report
- Design Basis Report
- 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 is responsible. The programme shall be prepared with a 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.
### 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 particular 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 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/Employer’ 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 & TVS). 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 DDC shall appoint a suitably qualified person(s) to act as the Lead Design Checker for various systems and disciplines like civil, architectural, and structural, MEP, Tracks, TVS & VAC etc. by engaging staff from a reputed external independent consulting firm subjected 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, DDC shall also propose the tentative list of potential lead design checker’s 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. DDC should sought approval from Employer/ Employer’s representative for engagement of lead design checker and inform at least one month in prior before replacing the lead design checker, failing which DDC will attract a penalty equivalent to 4 lakhs per month.

The Lead Design Checkers for various disciplines shall be a Professional Engineer with at least total design experience of twenty (20) years’ experience, with at least ten (10) years’ experience in handling design of large, complex design project(s) that includes Metro rail project work of a similar nature. Experience shall 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 Lead 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, VAC, TVS systems shall 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 isolux profiles and calculation for luminaries.
   - Lightning 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 shall be submitted to Employer/Employer’ Representative for approval. The QAP shall identify the personnel, procedures, instructions, records and forms necessary to implement 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:

i. 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;

ii. 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;

iii. The preparation, checking, issue, distribution, indexing and filing reports, calculations, drawings and specifications along with the means of their revisions;

iv. The formal design review, authorization and approval of design documentation;

v. The design verification and validation;

vi. The design checks by the Design Checker; and

vii. 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’s 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

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 reserves 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.

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

1. Site plans;
2. Plans at each station level;
3. Sections and elevations;
4. Construction sequence drawings;
5. Plans, sections, elevation and sketch design studies of all typical features. Typical repetitive conditions to be noted as such and located.
6. Traffic management plan and report
7. Design calculations to reflect the definition of the Works;
8. Drawings detailed to define the Works with reinforcing details;
9. Bill of Quantities for all the works in sufficient accuracy to be able to proceed to Tender;
10. Technical specifications in sufficient detail of materials and workmanship to permit tenderers to bid for the work;
11. 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.
12. An outline Construction Programme with consideration of construction methods,
13. A draft description of assumed construction methods,
14. Initial construction cost estimates
15. Comments, if any, on the documents supplied by the Employer/Employer’ Representative;
16. Any other documents that may have been requested by the Employer/Employer’
All drawings shall be submitted in legible copies of the appropriate size. 

The consultant shall provide the following Design Deliverables (common for all disciplines) 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, roads, landscaping, existing or proposed buildings and infrastructure, as well as any proposed additions, modifications, or required demolition.

2) Property development proposals shall include typical floor plans, sections, elevations, perspective sketches, landscaping. Public transportation, and interfaces with stations and ancillary facilities.

3) Quality Assurance Plan for Design

4) Overall Site plans, floor plans, elevations, Sections, sketches/ perspective exterior /interior views etc.

5) Materials and finishes presentation.

6) 3D Models and animations.

7) Area Schedule (net and gross as applicable)

8) Submission of Design Manuals.

9) Submission of technical specifications proposed for the work

10) Identification and submission of Design codes and standards

11) The CAD procedures

12) Preliminary station, structures, tunnels, viaducts, tracks, depot and allied structures, TVS, VAC, MEP (as applicable for particular DDC package) Layout and sizing with incorporation of information from CMRL phase 1 network

13) Preliminary bored, cut and cover tunnel and viaduct sizing, switch over ramp sizing, launching/ retrieval/ mid-way shaft sizing information as applicable for particular DDC package.

14) Preliminary Track layout, drainage details, shunting arrangements etc. for all the structures for elevated, underground, At-grade, Depot etc. as applicable for particular DDC package.

15) An alignment review and Topographic plan of all the elements on the alignment.

16) The preliminary construction methodology (launching schemes, sequences etc.).

17) The design submission programme.

18) Site surveys, existing building surveys, and other field survey.


20) The preliminary building and structure protection proposal, Potential Damage Assessment

21) The preliminary monitoring plan (Instrumentation and monitoring plans)

22) Preliminary MEP, VAC, TVS plans.

23) Typical installation drawings for all VAC equipment / materials.

24) Equipment schedule incorporating all MEP, TVS, VAC equipment including Electrical and SCADA system.

25) Submission of licensed original software’s.

26) 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 stations and depots 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 all Elevated and underground stations, Tracks, viaduct, TBM & NATM tunnelling, cut & cover box and U-section, switch over ramp and depot main elements and features as applicable for particular DDC package.
13. Provisions and proposals for construction interfacing with the interfacing contractors
14. Construction sequence and details of cut and cover tunnels, stations, bored tunnels, viaducts, tracks, depot etc. as applicable for particular DDC package
15. Proposed methods of predicting the ground movements due to work and adjacent to the excavations
16. Predictions of effect on structures due to ground movements and the proposed protective measures for UG portions to limit the effects to a degree not exceeding the limit as per relevant codes, standards and practices.
17. Cross passage (including sump arrangements)
18. MEP, VAC, TVS items in viaduct, stations (EL, UG, At-grade), depot, tunnels etc. as applicable for particular DDC package.
20. BOQ, Detailed estimates and detailed specifications for the preparation of tender for viaduct, elevated stations, UG station, tracks, MEP, VAC, TVS, tunnel, depots etc. as applicable for particular DDC package.
21. Floor plans (dimensioned), elevations (confirmed floor-to-floor heights), sections.
22. Sketches of critical and typical details.
23. Perspectives
24. Typical reflective ceiling plans.
25. 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, Air craft warning layout (If required) Fixture mounting arrangements.
26. Air conditioning & TVS layout
27. Detail design of electrical panel, cable size calculation
28. Detail design of SCADA system Architecture
29. Preparation of details Input/output (I/O) points for VAC equipment.
30. Preparation of Mode table for VAC operation
32. Other details as may be necessary for proper execution of requisite E&M works, TVS works and VAC works
33. Earthing single line diagrams. The location of earth pits may be shown on electrical layout.
34. Updated design features (options) report (with recommended option to take to detailed design), including serviceability issues.
35. 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).
36. Pumping systems
37. Electrical plant rooms such as UPS, DG set etc
38. Provisions for railway works, electrical and mechanical services and equipment
39. Proposed utilities
40. SEM drawings
41. Embedded items
42. Cross passage and sump arrangements
43. Cut and cover tunnel and other tunnelling method arrangements.
44. Viaduct construction sequence
45. 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 fixtures.
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, TVS, 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/ TVS) shall include, but not limited to:

I. General requirements
II. Manufacturer's eligibility criteria, Quality assurance and performance requirements
III. Documents required for vendor submittal
IV. Technical requirements
V. Requirements for the factory visit and Factory acceptance test
VI. 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.
VII. Testing and Commissioning requirements
VIII. Signage requirement for equipment and Materials
IX. 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, and TVS 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.
CHAPTER 15

15.1 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 CV's of all the key personnel working on this project for approval of Employer/Employer' Representative.

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/Employer' Representative 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/ Employer’s representative.

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 A list of personnel to be provided by the Consultant along with suggested staff man-months in PER 3.

15.8 A list of qualifications and experience requirements for Professional Staff is attached in PER 1.

15.9 The information furnished in PER 1 and 3 is provided for the purposes of evaluation of the Technical Proposal. Any additional staff proposed may be recorded in the technical proposal. The applicants are advised to frame the Technical Proposal for assessment in respect of marks to be given as part of evaluation criteria.

15.10 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 actually deployed in the Project at the time of submission of every bill to the employer.
**CHAPTER 16**

**DUTIES AND RESPONSIBILITIES OF CONSULTANT**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
<tr>
<td>a)</td>
<td>The consultant shall initiate the design works, in consultation with Employer/ Employer’s representative, 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. The duties of the consultant will be to properly supervise the works, approve the materials and workmanship of the works and facilitate the timely completion of the project. The consultant will administer the construction contracts and will ensure that the contractual clauses, whether related to quality or quantities of work, are complied with. The consultant shall have no authority to relieve the contractor of any of their duties or obligations under the contracts or to impose additional obligations not included in the contracts.</td>
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<td>b)</td>
<td>The duties of the consultant will also include the issue of decisions, certificates and instructions as specified in the construction contract documents.</td>
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<td>c)</td>
<td>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.</td>
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<tr>
<td>d)</td>
<td>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.</td>
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<td>e)</td>
<td>The consultant shall assist Employer/ Employer’s representative in obtaining the necessary design and regulatory approvals from the appropriate authorities for the stations, station areas, depot and any associated joint developments.</td>
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<td>f)</td>
<td>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.</td>
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<td>g)</td>
<td>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.</td>
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<td>h)</td>
<td>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.</td>
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</table>
| 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’s Representative.

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 nor 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/ Employer’s Representative 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’s Representative. 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/Employer’s Representative 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 records.

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

(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.

(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.

(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.

(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.

(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.

(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.

(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
(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.

(9) The Consultant shall provide written details as to the nature of the proposed correction to the Employer’s Representative.

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

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

Training
(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

1. The Consultant shall develop, maintain, update and handover a Building Information Model (BIM) for the Works. The Consultant acknowledges that CMRL’s BIM requirements are evolving and as such CMRL reserves the right to change or replace standards and specifications during the Works.

2. No later than fifteen (15) days after the award of the contract, the Consultant shall conduct a BIM Execution Plan (BEP) workshop in partnership with CMRL. The consultant shall jointly conduct the workshop with other DDCs to agree upon a common BIM platform for implementation.

3. No later than fifteen (15) days after the conduct of the BEP workshop, the Consultant shall submit a BIM Execution Plan arising from the workshop to CMRL for their approval. This plan shall contain information including but not limited to the BIM Goals or outcomes that are to be realized on the project, software to be used, file formats, collaboration model/workflow, and information exchange requirements.

4. As part of this BIM Execution Plan, the Consultant shall, in agreement with CMRL also submit a milestone-based schedule that contains key dates, as well as specific models and analysis that meet CMRL’s requirements that are to be progressively developed and delivered on these key dates. The scope of each model to be delivered will be indicated in this schedule. The Consultant will adhere to the deliverables provided in the BIM Execution Plan.

5. 3D BIM models to be built shall contain architectural, structural, mechanical and electrical components with relevant parametric information based on the outcomes of the BEP workshop.

6. 3D/4D Models built will be of a BIM Level of Detail (LOD) 300 or higher, as agreed upon at the BEP workshop and will be sufficiently detailed to produce traditional drawings or documents as views of multi-authored data.

7. In addition to developing 3D models, the Consultant may be required to develop visualizations and walk-throughs, a preliminary Bill of Quantities, a preliminary 4D model, detect and resolve clashes leading to the creation of a clash free model, in addition to other requirements that may emerge from the BEP workshop. The BIM models should support activities during all the stages of the project including, planning, conceptual design, tendering, detailed design, scheduling, construction, and operations.

8. The Consultant shall appoint qualified modellers, operators / BIM coordinators and BIM Manager, whose credentials and qualifications shall be submitted to CMRL for their approval.

9. The Consultant shall adopt a project intranet and file sharing system, into which all BIM model files and analysis information will be uploaded. CMRL will be given full access rights to this system. All the parties involved in the project should have "role-based" access to the latest approved model, along with modification history and changes that are being considered. BIM models built and analysis done will be handed over to and become the property of CMRL.

10. It is the Contractor’s responsibility to ensure that the information in the BIM, 2D/3D drawings and other submittals and models, including any data in Geographic Information System, shall be spatially coordinated and have consistent versioning, consistent classification and naming of objects with one another.
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 Works
to which the submission refers]

The contents of this submission are scheduled in Section A below.

The documents scheduled in Section B 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 in the documents scheduled in Section A below
  comply with the Employer’s Requirements and ...... [see note 1 below];

OR (in the case of a submission 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.
Chennai Metro Rail Project-Phase-II- DDC/P2C3/01

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
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):

<table>
<thead>
<tr>
<th>Station/Element/Component</th>
<th>Status</th>
<th>Unique Identification</th>
<th>Comments by Lead design checker</th>
<th>Response by Lead designer and closure of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section C**

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

<table>
<thead>
<tr>
<th>Submittal</th>
<th>No. of Paper Copies</th>
<th>No. of Electronic Copies</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial services Programme &amp; design submission programme plus with supporting information and narrative</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Monthly Programme Update</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Three Month Design Rolling Programme</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Three Week Rolling Programme</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Monthly Progress Report</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Preliminary and Definitive Designs</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Construction Reference Drawings</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Good for construction Drawings for each contract package as decided by Employer/ Employer’s representative</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Construction sequence</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Reports and documents as applicable</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>GADs, CSD (wall, ceiling, flooring etc.), SEM for each contract package as decided by Employer/ Employer’s representative</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Design Quality Assurance Plan</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Final Completion Report</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Traffic Management Plans</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Investigation, PDA, EBS and other survey reports.</td>
<td>3</td>
<td>2</td>
<td>A1 A3 A4</td>
</tr>
<tr>
<td>Any other submittals required by the Employer</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>As applicable</td>
</tr>
</tbody>
</table>

**Notes:**

i) Drawings to support A4 text documents shall be of A3 size.
CHENNAI METRO RAIL LIMITED
CHENNAI METRO RAIL PROJECT PHASE II

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION-4

ELIGIBILITY & QUALIFICATION CRITERIA

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
### Section-4
EVALUATION & QUALIFICATION CRITERIA

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQC Table</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Consultant's Experience &amp; technical capability</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Financial Standing</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Key Personnel</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>BID Scoring</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Notes to Bidder</td>
<td>12</td>
</tr>
</tbody>
</table>
1. EVALUATION & QUALIFICATION CRITERIA

a. The purpose of Mark system is to be able to put the Applicants into a “pecking order” of capability. Therefore whilst there may be some subjective consideration as to what constitutes the award of Marks, as much as possible criteria for awarding Marks has been laid down based on the response of the Applicant to the Questionnaire.

b. **Criteria 1.2 & 2 are mandatory to qualify.** Failing which bidder will not be evaluated further.

c. **Criteria 1.1, 1.2, 1.3 & 1.4:** If the work has been done by the foreign partner of JV and the work was done in the country of the foreign partner then in addition to this, the foreign partner must have done work equal to the work experience requirement outside the country of its origin.

d. **Award of Multiple contract criteria:** Bidders are allowed to participate for DDC contract packages P2C3-01, P2C3-02 & P2C3-05. Bidders may propose different teams of key personnel separately.

If the bidder is found to obtaining highest marks in all three DDC contract packages, he will be awarded maximum of two packages based on least cost combination (for two packages) to the CMRL.

However, in case bidders bid for all three packages with the same Key personnel, and he is able to secure highest marks in all the packages, they will be considered for only one package which ever, is least cost to CMRL.
## Section 4: Eligibility & Qualification Criteria

### Table: Eligibility and Qualification Criteria-QCBS

<table>
<thead>
<tr>
<th>No.</th>
<th>Factor/Sub-Factor</th>
<th>Maximum Marks</th>
<th>Requirement &amp; Marks Allocation</th>
<th>Compliance Requirements</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Single Entity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All Parties</td>
<td>one member</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Submission Requirements</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td><strong>Consultant’s Experience record &amp; Technical proposal for DDC works (max. 40 Marks)</strong> <em>(see footnote 5.1 for calculation relevant experience for JV/Consortium)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|     | Total years of experience in the field of detailed design consultancy services (* aggregation of individual experiences of JV/consortium members shall not be done) | 5 Marks | a) 10 years< Total years of experience< 5 years
More than 10 years – (5 Marks)
5 years - 1 Mark
(Marks will be given on pro-rata basis.)
b) Less than 5 years – Nil | Must meet requirement for minimum 1 Mark | N/A | Must meet requirement for minimum 2 Marks | ELI-1 |
| 1.2 | Total value of DDC contract done in metro rail/ rapid transit/ mass transit/ MRTS or any other rail based transit system during last five years in India or abroad. | 15 Marks | a) Must have done 1 similar contract costing minimum Rs. 109 cr.
Or,
b) Must have done 2 similar contracts costing minimum Rs. 68 cr.
Or,
c) Must have done 3 similar contracts costing minimum Rs. 54 cr. | Must meet requirement for 15 Marks | Joint Venture combined must meet requirement for 15 Marks. *(Note 5)* | TECH-2A with client certificates |
### 1.3 Specific Experience in

**Last 10 years for relevant Detailed Design Consultancy Experience in, underground stations, tunneling in Urban Area / MRT Projects**

<table>
<thead>
<tr>
<th>6 Marks</th>
<th></th>
</tr>
</thead>
</table>
| a) 20 UG stations (3 marks) <Design of UG Stations< 5 UG stations (1 mark)  
*Marks will be given on pro-rata basis.*  
Less than 5 UG stations= 0 marks  
10 Kms (3 marks) <Design of TBM tunneling with NATM cross passage in Kms < 5 Kms (1 mark)  
*Marks will be given on pro-rata basis.*  
Less than 5 Kms= 0 marks | Must meet requirement for minimum 2 Marks (minimum one each in a, b) |
| b) | Must meet requirement for minimum 2 Marks (minimum one each in a, b) |

N/A  
TECH-2A & EXP-1

---

**Section 4: Eligibility & Qualification Criteria**

FEBRUARY 2018
### Design Innovations and value engineering:

<table>
<thead>
<tr>
<th>1.4</th>
<th>6 Marks</th>
<th><strong>1.4</strong></th>
<th><strong>6 Marks</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Innovations</strong></td>
<td><strong>Green design:</strong></td>
<td><strong>6 Marks</strong></td>
<td><strong>Green design:</strong></td>
</tr>
<tr>
<td>and value engineering:</td>
<td>a) Two projects with Platinum/ gold level- 2 Marks</td>
<td><strong>6 Marks</strong></td>
<td>a) Two projects with Platinum/ gold level- 2 Marks</td>
</tr>
<tr>
<td>i) Green Design, ii) Multi-modal Integration and,</td>
<td>b) One project with Platinum/ Gold level- 1 Mark</td>
<td><strong>6 Marks</strong></td>
<td>b) One project with Platinum/ Gold level- 1 Mark</td>
</tr>
<tr>
<td>iii) Property</td>
<td>ii) <strong>Multi-Modal Integration:</strong></td>
<td></td>
<td>ii) Multi-Modal Integration:</td>
</tr>
<tr>
<td>Development</td>
<td>a) Two projects with Multi-modal integration- 2 Marks</td>
<td><strong>6 Marks</strong></td>
<td>a) Two projects with Multi-modal integration- 2 Marks</td>
</tr>
<tr>
<td></td>
<td>b) one project with Multi-modal integration- 1 Mark</td>
<td><strong>6 Marks</strong></td>
<td>b) one project with Multi-modal integration- 1 Mark</td>
</tr>
<tr>
<td></td>
<td><strong>iii) Property Development:</strong></td>
<td><strong>6 Marks</strong></td>
<td>iii) Property Development:</td>
</tr>
<tr>
<td></td>
<td>a) Two station projects with Mixed use/ multi-level property development - 2 Marks</td>
<td><strong>6 Marks</strong></td>
<td>a) Two station projects with Mixed use/ multi-level property development - 2 Marks</td>
</tr>
<tr>
<td></td>
<td>b) one station project with Mixed use/ multi-level property development - 1 Mark</td>
<td><strong>6 Marks</strong></td>
<td>b) one station project with Mixed use/ multi-level property development - 1 Mark</td>
</tr>
<tr>
<td></td>
<td><strong>Must meet requirement for minimum 2 Marks</strong></td>
<td><strong>Must meet requirement for minimum 2 Marks</strong></td>
<td><strong>Must meet requirement for minimum 2 Marks</strong></td>
</tr>
</tbody>
</table>
| | | | | **N/A**

### Quality Assurance

<table>
<thead>
<tr>
<th>1.5</th>
<th>2 Marks</th>
<th><strong>1.5</strong></th>
<th><strong>2 Marks</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality Assurance</strong></td>
<td><strong>Possesses QA Programme certified by ISO- 2 Marks, or,</strong></td>
<td><strong>2 Marks</strong></td>
<td><strong>Possesses QA Programme certified by ISO- 2 Marks, or,</strong></td>
</tr>
<tr>
<td></td>
<td><strong>b) Follows internal QA programme- 1 Mark</strong></td>
<td><strong>2 Marks</strong></td>
<td>b) Follows internal QA programme- 1 Mark</td>
</tr>
<tr>
<td></td>
<td><strong>Must meet requirement for minimum 1 Mark</strong></td>
<td><strong>Must meet requirement for minimum 1 Mark</strong></td>
<td><strong>Must meet requirement for minimum 1 Mark</strong></td>
</tr>
</tbody>
</table>
| | | | | **N/A**

EXP-1 and copy of relevant certificates

Certificate copy
| 1.6 | Design facilities | 2 Marks | a) Experience in 3D BIM integrated/ migrated design facilities involving designing of whole project with software like Revit, Tekla & Revit MEP, Newis works, software- 2 Marks, or, Experience in conventional design of whole project with AutoCAD, STADD pro, Plaxis, WALLAP & other conventional software and 3-D view development through 3DsMAX, MAYA, REVIT, Sketchup etc.- 1 Mark | Must meet requirement for minimum 1 Mark | Must meet requirement for minimum 1 Mark | N/A | Copy of licenses/ client certificates for validation |
| 1.7 | Methodology/Work Plan (max. 4 Marks) | | | | | |
| 1.7 a) | Deployment schedule of key and non-key personnel including submission of organization plan | 1 Mark | Submitted – 1 Mark | Not submitted – 0 Mark | Must meet requirement | Technical proposal (Please specify page numbers) |
| 1.7 b) | Project delivery schedule for DDC works including submission of “S” curve for the project | 1 Mark | Submitted – 1 Marks | Not submitted – 0 Mark | Must meet requirement | Technical proposal (Please specify page numbers) |
### Chennai Metro Rail Project-Phase II- DDC/P2C3/ 01

#### Eligibility & Qualification criteria

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Mark</th>
<th>Criteria</th>
<th>Requirement</th>
<th>Submission</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7 (c)</td>
<td>Innovative solutions proposed which may include optimization of land requirement, cost-effective technical solutions, and enhancement of non-fare revenue to the employer, aesthetically appealing and cost-effective conceptual design of the stations.</td>
<td>1 Mark</td>
<td>Submitted- 1 Mark</td>
<td>Must meet requirement</td>
<td>Technical proposal (Please specify page numbers)</td>
<td></td>
</tr>
<tr>
<td>1.7 (d)</td>
<td>Techniques and Strategies for Multi-modal Integration planning</td>
<td>1 Mark</td>
<td>Submitted – 1 Marks</td>
<td>Must meet requirement</td>
<td>Technical proposal (Please specify page numbers)</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Financial Standing (max. 25 Marks) *(See footnote 5.2, 5.3 & 5.4 to calculate the requirement for JV/ consortium)*

| 2.1 | Working Capital: Liquidity/ Line of credit and other financial means to meet cash flow requirement > Rs. 5 cr. for this contract, net of applicant’s commitments for other contracts. | 5 Marks | Pass- 5 Mark | Must meet requirement | Joint Venture combined must meet requirement. *(Note 9)* | FIN-1 & letter of line of credit from scheduled commercial banks |
| 2.2 | Net worth of Tenderer during last audited financial year should have been positive (+). In case of JV/consortium, the net worth of each member should have been positive (+). | 5 Marks | Pass- 5 Mark | Must meet requirement | Must meet requirement | Must meet requirement | FIN-1 |
## Eligibility & Qualification Criteria

### 2.3 Average annual turnover in the last 5 years should be above 40 cr.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Criteria</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Pass - 5 Mark, Fail - 0 Mark</td>
<td>Must meet requirement</td>
<td>JV combined must meet requirement (Note 5)</td>
</tr>
</tbody>
</table>

### 2.4 Profitability in the last 3 years in which last 2 years should be positive

<table>
<thead>
<tr>
<th>Marks</th>
<th>Criteria</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Pass - 5 Mark, Fail - 0 Mark</td>
<td>Must meet requirement</td>
<td>Must meet requirement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

### 2.5 Bid Capacity

<table>
<thead>
<tr>
<th>Marks</th>
<th>Criteria</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Pass - 5 Mark, Fail - 0 Mark</td>
<td>Must meet requirement</td>
<td>Joint Venture combined must meet requirement (Note 5)</td>
</tr>
</tbody>
</table>

### 3. Technical and organizational capability - Key personnel (Max. 25 Marks)

#### 3.1 Professional experience of the Key personnel proposed.

<table>
<thead>
<tr>
<th>Marks</th>
<th>Criteria</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>As per clause 3 of Section 4:EQC, Project Team Of The Consultant- Key Personnel</td>
<td>Must meet requirement</td>
<td>PER-1 &amp; PER-2</td>
</tr>
</tbody>
</table>

#### 3.2 Academic Qualification

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per clause 3 of Section 4:EQC, Project Team Of The Consultant- Key Personnel</td>
<td>Must meet requirement</td>
<td>PER-1 &amp; PER-2</td>
</tr>
</tbody>
</table>
## 3. PROJECT TEAM OF THE CONSULTANT- KEY PERSONNEL

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Key- Personnel</th>
<th>Nos.</th>
<th>Max. Marks</th>
<th>Experience</th>
<th>Distribution of marks</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Project Manager</td>
<td>1</td>
<td>3</td>
<td>Total Design Experience – 20 Years or more</td>
<td>1&lt;br&gt;10 Years or more (1 marks) &lt;Relevant Design Experience in the role of project manager/ Deputy Project manager in Metros works 5 years (0.5 marks)&lt;br&gt;Desirable Educational Qualification- Postgraduate Structures from a reputed institution.</td>
</tr>
<tr>
<td>2.</td>
<td>Lead Designer/ Underground (stations &amp; Tunnels)</td>
<td>1</td>
<td>3</td>
<td>Total Design Experience – 15 Years or more</td>
<td>1&lt;br&gt;10 Years or more (1 marks) &lt;Relevant Design Experience in the role of Lead designer for underground structures or Senior structural engineer in field of underground structures in Metros works 5 years (0.5 marks)&lt;br&gt;Desirable Educational Qualification- Postgraduate Structures from a reputed institution.</td>
</tr>
<tr>
<td>3.</td>
<td>Lead Designer/ Tracks</td>
<td>1</td>
<td>2</td>
<td>10 Years or more (1 marks) &lt;Relevant Design Experience in the role of Lead designer for tracks or Senior structural engineer in field of track design in Metros/ railways works 5 years (0.5 marks)&lt;br&gt;Desirable Educational Qualification- Postgraduate Structures from a reputed institution.</td>
<td>&lt;br&gt;PHD/ Doctorate- 1 Marks Postgraduate- 0.5 Marks&lt;br&gt;Marks will be given on pro-rata basis.</td>
</tr>
<tr>
<td>4.</td>
<td>Lead Designer/ Architect</td>
<td>1</td>
<td>3</td>
<td>Total Design Experience – 15 Years or more</td>
<td>1&lt;br&gt;10 Years or more (1 marks) &lt;Relevant Design Experience in the role of Lead designer for underground stations or Senior architect in field of Metros 5 years (0.5 marks)&lt;br&gt;Desirable Educational Qualification- Degree in architecture from a reputed institution</td>
</tr>
</tbody>
</table>
| 5.    | Lead Designer/ MEP | 1    | 3          | 10 Years or more (1 marks) <Relevant Design Experience in the role of Lead designer or Senior MEP engineer in field of MEP works in Metros/ Heavy Infra/ Industrial 5 years (0.5 marks)<br>Desirable Educational Qualification- Degree in Electrical Engineering from a reputed institution. |<br>PHD/ Doctorate- 1 Marks Postgraduate- 0.5 Marks Degree- 0.25 Marks<br>Marks will be given on pro-rata basis.
<table>
<thead>
<tr>
<th></th>
<th>Role Description</th>
<th>Total Design Experience</th>
<th>Other Criteria</th>
<th>Marking Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Lead Designer/TVS &amp; VAC systems</td>
<td>10 Years or more (1 marks) &lt;Relevant Design Experience in the role of Lead designer or Senior VAC/TVS engineer in field of TVS/VAC works in Metros/ Heavy Infra/ Industrial &lt; 5 years (0.5 marks)</td>
<td>Desirable Educational Qualification- Degree in Mechanical Engineering from a reputed institution.</td>
<td>Marks will be given on pro-rata basis.</td>
</tr>
<tr>
<td>7</td>
<td>Geotechnical Expert</td>
<td>10 Years or more (1 marks) &lt;Relevant Experience in the role of geotechnical expert in the similar works &lt; 5 years (0.5 marks)</td>
<td>Desirable Educational Qualification- Postgraduate in Geo-technical Engineering from a reputed institution.</td>
<td>PHD/ Doctorate- 1 Marks Postgraduate- 0.5 Marks Degree- 0.25 Marks</td>
</tr>
<tr>
<td>8</td>
<td>Senior quantity surveyor-cum-bid manager</td>
<td>10 Years or more (1 marks) &lt;Relevant similar Experience in large/ heavy infrastructure projects &lt; 5 years (0.5 marks)</td>
<td>Desirable Educational Qualification - Degree in civil Engineering from a reputed institution.</td>
<td>PHD/ Doctorate- 1 Marks Postgraduate- 0.5 Marks Degree- 0.25 Marks</td>
</tr>
<tr>
<td>9</td>
<td>Senior Interface Manager</td>
<td>10 Years or more (1 marks) &lt;Relevant similar Experience in large/ heavy infrastructure projects &lt; 5 years (0.5 marks)</td>
<td>Desirable Educational Qualification - Degree in Civil/ Electrical/ Mechanical Engineering from a reputed institution.</td>
<td>PHD/ Doctorate- 1 Marks Postgraduate- 0.5 Marks Degree- 0.25 Marks</td>
</tr>
<tr>
<td>10</td>
<td>Senior BIM Coordinator</td>
<td>7 Years or more (1 marks) &lt;Relevant similar Experience in large/ heavy infrastructure projects &lt; 3 years (0.5 marks)</td>
<td>Desirable Educational Qualification - Degree in Civil/ Architecture/Electrical/ Mechanical Engineering from a reputed institution.</td>
<td>Postgraduate- 1 Marks Degree- 0.5 Marks</td>
</tr>
</tbody>
</table>
4. BID SCORING

4.1 Technical bid Scoring:
*Technically to qualify the bidder should get minimum score of 60%.*

**Total Maximum score a bidder can get is 100 Marks.**

4.2 Financial bid Scoring:

Financial bid shall be given scoring as below:

The bidder who has quoted the lowest price will be assigned a score of 100 in the financial bid. The other bidders will be allotted score relative to the score of bidder with the lowest quote as below:

\[ FS = 100 \times \frac{F_1}{F} \]

Where:

- **Fs** = The financial score of the Financial Proposal being evaluated
- **F** = The quoted price of Financial Proposal under consideration
- **F<sub>1</sub>** = The price of lowest priced Financial Proposal

5.3 Combined evaluation:

The weighted combined score of the Technical bid (Ts), and Financial proposals (Fs) shall be used to rank the bidders on the basis of formula given as below:

**Combined Score = 0.7 Ts + 0.3 Fs**

The first ranked i.e. the highest scoring bidder will be considered for further processing.
5. **Notes to Bidder:**

5.1 In case of joint venture / consortia, full value of the work, if it was done by the same joint venture or the entire work was done fully by any of the member, shall be considered. For previous works done other than same JV the work experience will be calculated based on percentage participation in previous project and added in proportion to current percentage participation.

Example: Let Member-1 has percentage participation = M and Member – 2 has =N. Let the Work experience of Member-1 is ‘A’ and that of Member-2 is ‘B’, then the work experience of JV will be

\[ \text{Work experience of JV} = \frac{AM + BN}{100} \]

5.2 In case of JV/consortium, the requirement of working capital is to be distributed between members as per their percentage participation.

*For example,* Let Member-1 has percentage participation = M and Member-2 has percentage participation =N. If minimum working capital required is ‘W’ then working capital required of Member -1 ≥ (W.M)/100 and working capital required of Member -2 ≥ (W.N)/100.

5.3 Financial data for latest 5 years has to be submitted by bidders along with the audited Balance Sheets of 2012-13, 2013-14, 2014-15, 2015-16 and 2016-17. The financial data in the prescribed format shall be certified by charted Accountant with his stamp and signature. In case audited balance sheet of the last financial year is not made available by the bidder, he has to submit an affidavit certifying that the “balance sheet has actually not been audited so far”.

If Audited Balance Sheet is not submitted, the application will be considered as Non-responsive.

5.4 In case of Joint venture/ consortia, the financial standing criteria will be evaluated based on weighted average of the financial data of the members as per the percentage participation.

**Bid Capacity:** The Tenderers will be qualified only if their available bid capacity is more than the approximate cost of work. Available bid capacity will be calculated based on the following formula:

**Available Bid Capacity = 2xAxN − B**

Where,

A = Maximum of the value of Design works executed in any one year during the last five financial years *(updated to 31.12.2017 price level assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year).*

N = No. of years prescribed for completion of the work

B = Value of existing commitments for on-going project management works
during period of 48 months w.e.f. \textit{31.12.2017}.

In the case of a group/JV, the above formula will be applied to each member to the extent of his proposed participation in the execution of the work.

\textbf{Example for calculation of bid capacity in case of JV / Group}

Suppose there are ‘P’ and ‘Q’ members of the JV / group with their participation in the JV / group as 70% and 30% respectively and available bid capacity of these members as per above formula individually works out ‘X’ and ‘Y’ respectively, then Bid Capacity of JV / group shall be as under:

\textbf{Bid Capacity of the JV / group = 0.7X + 0.3Y}

Tenderers, which do not qualify bid capacity criteria, shall not be considered for further evaluation and shall be rejected.

a. Financial data of the design work done for latest last five financial years has to be submitted by the Tenderer with audited financial statements. The financial data in the prescribed format shall be certified by the Chartered Accountant with his stamp and signature.

b. Value of existing commitments for on-going construction works during period of 48 months w.e.f. \textit{31.12.2017}.has to be submitted by the Tenderer. \textbf{These data shall be certified by the Chartered Accountant with his stamp and signature.}

c. In case of Joint venture/ consortia, the bid capacity criteria will be evaluated for each member applying above formula & combined bid capacity of the JV/consortia it will be evaluated based on weighted average of the individual bid capacity of the members as per the percentage participation.
CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH: (-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE-II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION-5
TECHNICAL BIDDING FORMS

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT, POONAMALLEE HIGH ROAD, KOYAMBEDU, CHENNAI – 600107. INDIA
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<tr>
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</tr>
<tr>
<td>FLC-1</td>
<td>Familiarity Certificate</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>Format of Bank Guarantee for Tender Security</td>
</tr>
</tbody>
</table>
Form Tech – 1: Technical Bid Submission

[Location, Date]

To:

Chief General Manager
(UG-Construction)
Chennai Metro Rail Limited
Admin. Building, CMRL Depot
Poonamallee High Road
Koyambedu, Chennai- 600 107
Tamilnadu, India

Dear Sirs:

We, the undersigned, offer to provide the consulting services for [Insert name of assignment] in accordance with your notice inviting tender dated [Insert Date] and our Proposal.

“We are hereby submitting our Proposal, which includes this Technical Proposal and a Financial Proposal sealed in a separate envelope”

We are submitting our Proposal as a firm/joint venture with: [Insert a list with full name and the legal address of each member, and indicate the lead member]. We have attached a copy [insert: “of our letter of intent to form a joint venture” or, if a JV is already formed, “of the JV agreement”] signed by every participating member, which details the likely legal structure of and the confirmation of joint and severable liability of the members of the said joint venture.

(If the Consultant’s Proposal includes Sub-consultants, insert the following :) We are submitting our Proposal with the following firms as Sub-consultants: [Insert a list with full name and address of each Sub-consultant.]

We hereby declare that:

(a) All the information provided and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification by the Client.

(b) Our Proposal shall be valid and remain binding upon us for the period of time specified in Clause 7.1 of ITB.
(c) We have no conflict of interest in accordance with ITB 3.

(d) We meet the eligibility requirements as stated in ITB 5, and we confirm our understanding of our obligation to abide by Employer’s policy in regard to corrupt and fraudulent practices as per ITB 4.

(e) We undertake to negotiate the Contract on the basis of the proposed Key Experts.

(f) Our Proposal is binding upon us.

We understand that the Client is not bound to accept any Proposal that the Client receives.

Yours sincerely,

Authorized Signature [in full and initials]: ________________________________

Name and Title of Signatory: ________________________________

Name of Consultant [company’s name or JV’s name]:

In the capacity of: ________________________________

Address: ________________________________

Contact information [phone and e-mail]: ________________________________

[For a joint venture, either all members shall sign or only the lead member, in which case the power of attorney to sign on behalf of all members shall be attached]
TECH- 2: TECHNICAL PROPOSAL:

Requirements for Tenderer's Technical Proposals

1. The Tenderer's Technical Proposals shall comply or, subject to reasonable development, be capable of complying with the Employer's Requirements in all respects. The Tenderer's Technical Proposals shall demonstrate such compliance. The Tenderer's Technical Proposals shall establish firmly the intended design the Specifications for the Permanent Works.

2. The Technical Proposal should cover in detail the following:

Scope Analysis:
- Comprehensive study of works including understanding and comprehension of works involved, evaluation of scope and appropriate methodology proposed to execute the work.

Experience of the Firm:
- A brief description of the Consultants’ organization and an outline of recent experience of the Consultants and, in the case of Joint Venture, for each member, on assignments of a similar nature.
- For each assignment, the outline should indicate the names of Sub-consultants/ Experts who participated, duration of the assignment, contract amount, and Consultant’s involvement.
- Information should be provided only for those assignments for which the Consultant was legally contracted individually as corporate entity or, as a lead firm or one of members within a Joint Venture.
- Assignments completed by individual Experts working privately or through other consulting firms cannot be claimed as the experience of the Consultant, or that of the Joint Venture members, but can be claimed by the Experts themselves in their CVs.
- Consultants should be prepared to substantiate the claimed experience if so requested by the Client.
- Tenderer shall submit the following:
  (i) Introducing the Consultant’s organization.
  (ii) Design quality assurance plan.
  (iii) Details of insurance providers.
  (iv) Details about Relevant completed projects illustrating the Consultant’s Relevant experience. No promotional material should be included.

General approach and methodology, work plan:
- Understanding and comprehension of the work involved.
- A description of the approach, methodology and work plan for performing the assignment for carrying out the services covered in the Scope of Work, including such detailed information as deemed relevant. Covering the following subjects: technical approach and methodology, staffing for training, work plan, and organization and Expert schedule inclusive of charts and diagrams. A detailed overall work programme and a bar chart indicating the duration and timing of assignment of each key staff or other staff member assigned to the project.
- In addition, the technical proposal shall contain:
- An organisation chart together with clear description of the responsibilities of each
member within the overall work programme. Sufficient proof shall be submitted to substantiate the qualification and experience of staff deployed.

- The technical proposal will be evaluated based on the capabilities /technical strength of staff proposed to be deployed.

- A task list of deliverables and delivery dates, and the person responsible for performing the deliverable.

- The name, background and professional experience of each key staff member to be assigned to the project, with particular reference to his experience of a nature similar to that of the proposed assignment. (The majority of the key staff shall be regular members of the firm for at least six months and all members of Expertise team shall be regular employees).

- The details of the name, background and CV of any sub-contracted staff with their consent letter who will be employed on the project.

- The names and addresses of any firm who may be given sub-contracts with details of their experience in the Delhi or other areas.

- The details of equipment and laboratory facilities with such subcontractors/ sub consultants shall be provided.

- Details of design facilities, together with their location.

**List of proposed Key Expert team and Summary of CV particulars Key Experts’ CVs:**

The list of the proposed team by area of expertise, the position that would be assigned to each team member and duration of engagement of their services, their tasks and a summary of essential CV information. CVs of the Key Experts should be signed by the Key Experts themselves. Sufficient proof shall be submitted to substantiate the qualification and experience of staff proposed.

**Expert schedule:**

Estimates (man-months) of the Experts needed to carry out the assignment should be indicated separately for Chennai office and outstation support.

**Work Schedule:**

The work plan should be consistent with the proposed Work Schedule. This shall include project management plan, mobilization schedule (including sub-consultants), Safety Plan, Quality Assurance and Quality control plan during design phase and execution respectively.

**The above details should be submitted separately for Architecture, Structures, and tracks, MEP, TVS and VAC Services. The offer should cover the entire Scope of Work, as laid out in tender documents.**

Upon his appointment, the DDC shall promptly commence setting up its exclusive organization to the satisfaction of CMRL. The same shall be housed at one location in Chennai without any extra cost to CMRL. All work for the project shall be performed at Chennai.
REQUIREMENTS FOR TENDER PROGRAMME

1) The Tender Programme shall show how the Tenderer proposes to organize and carry out the Works and to achieve Stages and complete the whole of the Works by the given Key Dates.

2) The Tender Programme or Programmes shall be developed as a critical path network using suitable software. The network must be fully resourced and show the co-ordination with System wide Designs and Contracts. The Works Programme shall show achievement of all Key Dates and Works Area Access Dates.

3) The Tender Programme shall include of the Tenderer's Design Submission Programme and should indicate, wherever possible, dates and periods relating to interfaces with and between others including dates for submission of further documents required by the Contract and periods for their acceptance.

4) The Tender Programme shall contain sufficient detail to assure the Employer of the feasibility of the plan and approach proposed by the Tenderer.

5) The Tenderer should have regard to the possibility, as referred to in paragraph C8 of the Instructions to Tenderers that during the tender evaluation period the Tender Programme may be developed into a Programme which, in the event of award, would be the initial submission of the Works Programme. To facilitate this process, the Tenderer shall, in the preparation of the Tender Programme, take due account of the provisions of the Employer's Requirements in so far as they concern the Works Programme.

6) The Tender Programme shall be accompanied by a narrative statement that shall describe Programme activities, assumptions and logic, and highlight the Tenderer's perception of the major constraints and critical areas of concern in the organisation, construction and completion of the Works.
# Form Tech – 2A: WORK EXPERIENCE

(FOR DDC WORKS)

## NAME OF THE TENDERER (CONSTITUENT MEMBER IN CASE OF JV/CONSORTIUM):

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Particulars</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Name of work:</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Agreement / contract No &amp; Date:</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Name of Sub-consultant / experts &amp; Duration of their Assignment:</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Client/ Employer’s name &amp; Address:</td>
<td></td>
</tr>
<tr>
<td>5.a</td>
<td>Scope / Nature of work:</td>
<td></td>
</tr>
<tr>
<td>5.b</td>
<td>Number of underground stations, methodology adopted,</td>
<td></td>
</tr>
<tr>
<td>5.c</td>
<td>Length of metro rail Tunnel, Tunnel diameter, Methodology adopted for tunneling, local groundwater condition etc.:</td>
<td></td>
</tr>
<tr>
<td>5.d</td>
<td>Depot development with allied facilities with area of development:</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Date of start:</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Stipulated date of completion:</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Actual date of completion:</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Total value of DDC works done at Award &amp; Percentage participation:</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Total value of DDC work done on completion:</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Value of work certified till date:</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Ref to client’s completion certificate to be attached as per ITB clause 10.1 (a):</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

1. Separate Performa shall be used for each work. Details of only similar works prescribed in the minimum eligibility criteria shall be submitted.

2. Only the value of contract as executed by the tenderer / member of the JV/Consortium in his own name should be indicated. Where a work is undertaken by a group, the portion of the contract which is undertaken by the tenderer / member of JV/Consortium should be indicated and the remaining done by the other members of the group be excluded.

3. All the details should be supported by documentary proof e.g. completion certificates from client and concerned Consultant/Architect otherwise it will not be considered.
Form Tech – 2B: WORK EXPERIENCE

(DDC work done during the last five financial years)

NAME OF THE TENDERER (CONSTITUENT MEMBER IN CASE OF JV/CONSORTIUM):

(All Amounts In Rupees In Crores)

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Financial Data for Latest Last 5 Audited Financial Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 2012-13</td>
</tr>
<tr>
<td>1 2</td>
<td>4</td>
</tr>
<tr>
<td>Total value of <strong>DDC</strong> work done as per audited financial statements</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
1. Separate Performa shall be used for each member in case of JV/Consortium.

2. Attach attested copies of the Audited Financial Statements of the last five financial years as Annexure.

3. All such documents reflect the financial data of the tenderer or member in case of JV/Consortium, and not that of sister or parent company.

4. The financial data in above prescribed format shall be certified by Chartered Accountant / Company Auditor under his signature & stamp.

5. The above financial data will be updated to **31.12.2017** price level assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year.
Form ELI - 1: Bidder Information

Date: [insert day, month, year]

[The Bidder shall provide the following information separately for DDC works respectively for each member of JV.]

1. Bidder’s legal name: [insert full name]

2. In case of JV, legal name of the lead member and of each member: [insert full name of each member in the JV and specify the representative member]

3. Bidder’s actual or intended year of incorporation: [insert year of incorporation]

4. Bidder’s legal address in country of registration: [insert street/number/town or city/country]

5. Bidder’s authorized representative information
   
   Name: [insert full name]
   
   Address: [insert street/number/town or city/country]
   
   Telephone/Fax numbers: [insert telephone/fax numbers, including country and city codes]
   
   Email Address: [insert E-mail address]

6. Attached are copies of original documents of:
   
   ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of legal entity named above.
   
   ☐ In case of JV, letter of intent to form JV or JV agreement.

7. Total years of experience in the DDC works:
Form ELI-2:

Undertaking For Not Being Blacklisted

We do hereby undertake that we have not been blacklisted or deregistered by the Central Government, any state Government, PSUs or any Metro Rail authority in India and also that none of our work was rescinded by the client after award of contract as per clause 5.2 of Instruction to Bidders (ITB) during last 10 years.

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY

NOTE:

1. In case of JV/Consortium, the undertaking shall be submitted by each member of the JV/Consortium.

2. The undertaking shall be signed by authorized signatory of the tenderer or constituent member in case of JV/Consortium.
Form ELI-3:

Undertaking Regarding Corrupt & Fraudulent Practice

It is confirmed and declared that we, or any of our associate(s), have not been engaged in any fraudulent and corrupt practice as defined in clause 4 of Instruction to Bidders (ITB) and that no agent, middleman or any intermediary has been, or will be, engaged to provide any services, or any other items of work related to the award and performance of this contract. The Consultant further confirms that its firm has no financial or managerial ties with other organization that could influence its independence.

STAMP & SIGNATURE OF AUTHORIZED SIGNATORY

NOTE:

1 In case of JV/Consortium, the undertaking shall be submitted by each member of the JV/Consortium.

2 The undertaking shall be signed by authorized signatory of the tenderer or constituent member in case of JV/Consortium.
Form EXP - 1: Specific Experience

[The following table shall be filled in for Contracts performed by the Bidder and by each member of a JV.]

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Activity</th>
<th>Similar Contract No.</th>
<th>Information</th>
<th>Ref. to Employer's certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Design of underground stations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Design of TBM Tunnel with NATM Cross-Passage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Design of launching/retrieval shafts, mid-shafts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Green Design experience based on certification obtained in previous projects designed in last 5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Property development.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>QA Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Design Facility</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Form FIN - 1: FINANCIAL DATA

**(FINANCIAL STANDING)**

**NAME OF THE TENDERER (CONSTITUENT MEMBER IN CASE OF JV/CONSORTIUM):**

*(All Amounts in Rupees in Crores)*

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Financial Data for Latest Last 5 Audited Financial Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Year 2016-17</td>
</tr>
<tr>
<td>1</td>
<td>Total Assets</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Current Assets</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total Liabilities</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Current Liabilities</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Profits Before Taxes</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Profits After Taxes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Net Worth [= 1 - 3]</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Working Capital [= 2 - 4]</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Annual Turnover</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Total value of DDC work done as per audited financial statements</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

1. Separate Performa shall be used for each member in case of JV/Consortium.

2. Attach copies of the audited balance sheets, including all related notes, income statements for the last five audited financial years, as indicated above.

3. All such documents reflect the financial data of the tenderer or member in case of JV/Consortium, and not that of sister or parent company.

4. The financial data in above prescribed format shall be certified by Chartered Accountant / Company Auditor under his signature & stamp.

*(If Audited Balance Sheet is not submitted, the application will be considered as Non-responsive.)*
Form FIN - 2: FINANCIAL DATA
(EXISTING COMMITMENTS FOR ON-GOING DDC WORKS)

NAME OF THE TENDERER (CONSTITUENT MEMBER IN CASE OF JV/CONSORTIUM)
(All amounts in Rupees in Crores)

<table>
<thead>
<tr>
<th>Name and brief particulars of contracts for on-going DDC/PMC works</th>
<th>Contract Value</th>
<th>Value of balance work yet to be done (as on 31.12.2017)</th>
<th>Estimated Completion Date</th>
<th>Value of existing commitments for on-going DDC works during period 48 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**TOTAL (FOR ALL ONGOING WORKS)**

**NOTE:**

1. Separate Performa shall be used for each member in case of JV/Consortium.

2. Tenderer or member in case of JV/Consortium should provide information on their current commitments for all contracts that have been awarded or for which a letter of intent or acceptance has been received or for contracts approaching completion but for which a completion certificate is yet to be issued even if completion of such works spills over beyond completion period of this contract.

3. The financial data in above prescribed format shall be certified by Chartered Accountant / Company Auditor under his signature & stamp.
Form PER - 1: Team Composition, Task Assignments and Summary of CV Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Area of Expertise</th>
<th>Position Assigned</th>
<th>Task Assigned</th>
<th>Key Expert or Non-Key Expert</th>
<th>Firm Acronym &amp; Employment Status with Firm (full-time, or other)</th>
<th>No. of years of relevant project experience</th>
<th>Total Experience in years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>


Form PER - 2: Curriculum Vitae (CV) for Proposed Key Experts

1. General

<table>
<thead>
<tr>
<th>Position Title and No.</th>
<th>[e.g., TEAM LEADER] [Note: Only one candidate shall be nominated to each position.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Key Expert</td>
<td>[Insert full name]</td>
</tr>
<tr>
<td>Name of the Firm proposing the Key Expert</td>
<td></td>
</tr>
<tr>
<td>Date of Birth</td>
<td>[day/month/year]</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
</tr>
<tr>
<td>Country of Citizenship/Residence</td>
<td></td>
</tr>
</tbody>
</table>

2. Education: [List college/university or other specialized education, giving names of educational institutions, dates attended, degree(s)/diploma(s) obtained]

3. Employment record relevant to the assignment: [Starting with present position, list in reverse order. Please provide dates, name of employing organization, titles of positions held, types of activities performed and location of the assignment, and contact information of previous clients and employing organization(s) who can be contacted for references. Past employment that is not relevant to the assignment does not need to be included.]

4. Membership in Professional Associations and Publications:

<table>
<thead>
<tr>
<th>Period</th>
<th>Employing organization and your title/position.</th>
<th>Summary of activities performed relevant to the Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contact information for references</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 5: Bidding Forms
5. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

(i) This CV correctly describes my qualifications and my experience;
(ii) I am committed to undertake the assignment within the validity of Proposal;
(iii) I am not part of the team who wrote the terms of reference for this consulting services assignment;
(iv) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.

________________________________________________________________________ Date: ____________

[Signature of Key Expert]

Note:

The CVs of the Key Professional Staff should be signed on every sheet by the personnel concerned and the last sheet of each CV should also be signed by the authorized signatory of the applicants.
FIR-1: SAMPLE FORMAT FOR BANKING REFERENCE FOR LIQUIDITY

BANK CERTIFICATE

This is to certify that M/s .................................................... is a reputed company with a good financial standing.

If the contract for the work, namely...........................................................................................................is awarded to the above firm, we shall be able to provide overdraft / credit facilities to the extent of Rs....................... to meet their working capital requirements for executing the above contract.

___Sd.___
Name of Bank:__________
Senior Bank Manager_____________
Address of the Bank_______________

• Change the text as follows for Joint Venture:

This is to certify that M/s .................................................... who has formed a JV with M/s .................................................... and M/s .................................................... for participating in this bid, is a reputed company with a good financial standing.

If the contract for the work, namely...........................................................................................................is awarded to the above joint venture, we shall be able to provide overdraft / credit facilities to the extent of Rs....................... to M/s .................................................... to meet their working capital requirements for executing the above contract.

[This should be given by the JV members in proportion to their financial participation]
COPYRIGHT UNDERTAKING

Date ………………

To:
Chief General Manager/UG-Construction
Chennai Metro Rail Limited
Admin. Building, CMRL Depot
Poonamallee High Road
Koyambedu, Chennai- 600 107
Tamilnadu, India

LETTER OF UNDERTAKING

Contract:……………………………………………………………………………………………….. (Fill the name of work)

We, (name of tenderer / joint venture) hereby undertake that the tender drawings & documents purchased as a necessary part of our preparation of this tender shall be used solely for the preparation of the tender and that if the tender is successful, shall be used solely for the design of the temporary and permanent works.

We further undertake that the aforesaid tender drawings & documents prepared by Chennai Metro Rail Limited shall not be used in whole, in part or in any altered form on any other project, scheme, design or proposal that the joint venture, the joint venture parent companies or sub-contractors of the joint venture are, or will be involved with either in India or any other country.

Signed………………………
(Seal)
For and on behalf of
(Name of tender / joint venture)
FLC 1: FAMILIARITY CERTIFICATE

“We have inspected the site and we are familiar with the geological and topographical conditions, and local conditions and local bye-laws to perform the services.”

[Sd-]

(Seal)

For and on behalf of

(Name of tender / joint venture)
FORM OF BANK GUARANTEE FOR TENDER SECURITY

(To be stamped in accordance with Stamp Act, if any, of the country of issuing bank)

1. KNOW ALL MEN by these presents that we .................................................... (Name of Bank) having our registered office at ......................... (Name of country) (hereinafter called “the Bank”) are bound unto Chennai Metro Rail Limited (hereinafter called “the Employer”) in the sum of ` ................... for which payment will and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents.

2. WHEREAS………………………(Name of Tenderer) (hereinafter called “the Tenderer”) has submitted its tender dated_________for ………….. (Name of the work as per clause 1.1of NIT) hereinafter called the Tender.

AND WHEREAS the Tenderer is required to furnish a Bank Guarantee for the sum of ………………… as Tender Security against the Tenderer’s offer as aforesaid.

AND WHEREAS…………………………… Name of Bank) have, at the request of the Tenderer, agreed to give this guarantee as hereinafter contained.

3. We further agree as follows:

   (a) That the Employer may without affecting this guarantee grant time or other indulgence to or negotiate further with the Tenderer in regard to the conditions contained in the said tender and thereby modify these conditions or add thereto any further conditions as may be mutually agreed upon between the Employer and the Tenderer.

   (b) That the guarantee hereinbefore contained shall not be affected by any change in the constitution of our Bank or in the constitution of the Tenderer.

   (c) That any account settled between the Employer and the Tenderer shall be conclusive evidence against us of the amount due hereunder and shall not be questioned by us.

   (d) That this Guarantee commences from the date hereof and shall remain in force till ………………… (date to be filled up) (up to 208 days after the due date of tender submission).

   (e) That the expression ‘the Tenderer’ and ‘the Bank’ herein used shall, unless such an interpretation is repugnant to the subject or context, include their respective successors and assigns.

4. THE CONDITIONS OF THIS OBLIGATION ARE:

   (a) if the Tenderer withdraws his Tender during the period of Tender validity specified in the Notice Inviting Tender, or

   (b) if the Tenderer does not accept the correction of his tender price in terms of Clause 13.6.2 (Correction of Errors) of the ITB “Instructions to Bidders”.

Section 5: Bidding Forms

FEBRUARY 2018
i. if the Tenderer having been notified of the acceptance of his tender by the Employer during the period of tender validity:

ii. fails or refuses to furnish the Performance Security in accordance with Clause 31 (Performance Guarantee) of the GCC “General Conditions of contract” & Clause 14.3 of ITB “Instructions to Bidders” and/or

iii. fails or refuses to enter into a Contract within the time limit specified in Clause 17(Award of Contract and Signing of Agreement) of the ITB “Instructions to Bidders”.

“We (Name and Address of Bank) undertake to pay to the Employer without demur up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of any one or more of the conditions mentioned above, specifying the occurred condition or conditions”

Signature of Authorized Official of the Bank

Signature of Witness

Name : ..................................................

Address : ..................................................

Name of Official

........................................

Designation

........................................

Stamp/Seal of the Bank

........................................
“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

SECTION 6

FINANCIAL PACKAGE

FEBRUARY 2018
## SECTION-6
### FINANCIAL BID

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Letter of Price Bid</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Financial bid summary</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Schedule of Payment</td>
<td>9</td>
</tr>
<tr>
<td>4.</td>
<td>Proforma for statement of minor deviations</td>
<td>14</td>
</tr>
</tbody>
</table>
PART-I

Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018
Letter for Price Bid
(To be put in sealed cover along with the price bid)

To,
Chief General Manager (UG- Construction)
CHENNAI METRO RAIL LIMITED
Administrative Building, CMRL Depot,
Poonnamallee High Road,
Koyambedu, Chennai – 600107.
Tamilnadu, India

Sub: CONTRACT – PHASE II – DDC/P2C3/ 01- Letter of Price Bid

Dear Sirs:

We, the undersigned, offer to provide the consulting services for “ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH: (-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT” in accordance with your Notice Inviting tender dated [insert Date] and in conformity with the bidding documents.

We, have examined and have no reservations to the bidding documents including addenda issued by employer.

Our attached Financial Proposal is for the sum of [insert amount(s) in words and figures].

Our Financial Proposal shall be binding upon us and may be accepted at any time before expiration of the validity period of the Proposal.

If our bid is accepted we commit to obtain performance security in accordance with contractual provisions.

We understand that this bid, together with your written acceptance thereof, included in your letter of Acceptance (LoA), shall constitute a binding contract between us, until a formal contract is prepared and executed.

We understand you are not bound to accept the lowest evaluated bid or any other Proposal you receive.
We acknowledge that the Appendices, Corrigendum and Addendum will form an integral part of the Contract.

On acceptance of our tender, we will provide unconditional and irrevocable performance security payable in Chennai branch, guarantees and warranties as stipulated in the Conditions of Contract hereto. We understand that you are not bound to accept the lowest or any tender you may receive.

This tender shall be governed by and construed in all respects according to the laws for the time being in force in the Republic of India. For settlement of disputes, the Courts at Chennai will have jurisdiction in the matter.

Unless and until a formal Agreement is prepared and executed, this tender together with your Letter of Acceptance thereof shall form a binding Contract between CMRL & M/S...........

Yours sincerely,

Authorized Signature [in full and initials]: __
Name and Title of Signatory: ______
Name of Firm: ______
Address: ____

Notes:
1. In case of bid submitted by JV the name of the JV shall be specified as name of bidder.
2. The person signing the bid shall have the Power of Attorney given by bidder/ all members of JV.
1. **Financial bid summary:** The Lump Sum Price of: (The tenderer should quote his offer in Indian Rupees Only)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Rate in INR to be quoted by the bidder in figures</th>
<th>Unit Rate in INR to be quoted by the bidder in words</th>
<th>Total amount in INR in figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UG section Tunneling by TBM/ NATM etc. excluding station lengths (Civil &amp; Structural) (including cut &amp; cover portion, launching shafts, retrieving shafts, mid- shafts, fit-outs and allied structures etc)</td>
<td>R. Km</td>
<td>12.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Cross-passages by NATM etc. including drainage systems, sumps, etc.</td>
<td>Each</td>
<td>51 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Underground stations, Type-A, upto 190m length, with 2 levels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.a</td>
<td>Civil, Structural and Architectural</td>
<td>Each</td>
<td>10 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.b</td>
<td>Architectural Finishes</td>
<td>Each</td>
<td>10 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Unit</td>
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<tr>
<td>3.c</td>
<td>MEP works</td>
<td>Each</td>
<td>10 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><strong>Underground stations, Type-B, upto 150m length, with 2 levels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.a</td>
<td>Civil, Structural and Architectural</td>
<td>Each</td>
<td>3 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.b</td>
<td>Architectural Finishes</td>
<td>Each</td>
<td>3 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.c</td>
<td>MEP works</td>
<td>Each</td>
<td>3 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td><strong>Underground stations Type-C, upto 150m length, with 3 or more levels</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5.a</td>
<td>Civil, Structural and Architectural</td>
<td>Each</td>
<td>7 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.b</td>
<td>Architectural Finishes</td>
<td>Each</td>
<td>7 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.c</td>
<td>MEP works</td>
<td>Each</td>
<td>7 Nos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>MEP Works for Underground tunnel section including cross passages etc</td>
<td>R. Km</td>
<td>12.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>VAC works for Underground Section</td>
<td>L.S</td>
<td>1 No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>TVS works for Underground Section</td>
<td>L.S</td>
<td>1 No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tracks works (Permanent Way) for UG section complete in all respects (including station length)</td>
<td>R. Km</td>
<td>16.27</td>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>------------------------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Software (Licenses) (Sum-total of Table 2, below)</td>
<td>L.S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Total Contract price excluding tax *</td>
<td>(In words)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>GST @ 18% of the Total Contract price**</td>
<td>(In words)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Grand Total (including GST)</td>
<td>(In words)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* Evaluation will be based on amount quoted excluding GST

** In case of any change in GST rate the same will be corrected after gazetted notification.
Table 2: In line with Chapter 17- Software supports. Contractor should quote unit rate for each software license. Payment will be made only for the items supplied as required by CMRL as per actuals as detailed below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Purpose</th>
<th>Software proposed</th>
<th>No. Of User Licenses in the name of CMRL valid for the duration of the contract</th>
<th>Unit rate in INR</th>
<th>Amount in INR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Software for Civil, Structural, Architectural, Tracks,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td>Programme design/ construction, Project plan/ control etc.</td>
<td>Primavera P6 (now Oracle PPM)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii.</td>
<td>Signage Design</td>
<td>Corel Draw</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>Graphic Presentation/ sheets</td>
<td>Adobe illustrator</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>Building Information Modelling*</td>
<td>AEC Package for civil, structural, architectural, MEP, Clash detection etc.</td>
<td>3 User licenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>Tracks</td>
<td>Bentely</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi.</td>
<td>Architectural</td>
<td>AutoCAD</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii.</td>
<td>Structural design</td>
<td>Stadd Pro</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii.</td>
<td>Structural design</td>
<td>Wallap</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix.</td>
<td></td>
<td>Plaxis</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x.</td>
<td></td>
<td>Revit Structural</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Software to TVS/ VAC only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------------</td>
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</tr>
<tr>
<td>xi.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling Load calculation</td>
<td>HAP Software</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xii.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAMS Tool</td>
<td>FRACAS tool</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xiii.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFD Analysis</td>
<td>3D (CFD) Analysis software</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 D Analysis Software</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
PREAMBLE

1. The Lump Sum amount quoted in Indian Rupees by the tenderer shall be distributed in the manner specified in pricing schedule of Financial Package for all purposes.

2. Further bifurcation of schedule of payments for each price centre shall be proposed and submitted to the Employer for approval for all the disciplines (like civil, structural, architectural, MEP, tracks, VAC, TVS etc.) within 15 days of the issue of Letter of Acceptance. The proposed bifurcation should be in line with percentage distribution of Lump-sum quoted price by the bidder and the percentages mentioned in the price centres.

3. The stage payments will be made on pro-rata basis of the corresponding items & activities, after deducting all statutory taxes, levies, Liquidated Damages, etc. if any. GST shall be reimbursed as per actual production of proof of payment. The consultant has to pass on the benefit of input tax credit to the Employer.

4. Wherever the design calculations and minor reports are required as part of the design and drawings, the same shall be submitted. They shall be deemed to have been paid through the respective drawings and no separate payment shall be made for the same.

5. If the tenderer fails to quote rates against any item, the tender may be treated as incomplete and non-responsive and shall be rejected.

6. **Payment currency and schedule**
   a. The currency of payment shall be in Indian Rupees (INR) only.
   b. All Payments shall be released on approval of submissions by Employer/Employer’s Representative (with Lead Design Checker Certificate).
   c. The payment schedule for design consultancy shall be as per the Price Schedule.

7. Errors will be corrected by the employer for any arithmetic errors in computation or summation as per contract conditions.

8. All the unit rates and amounts should be filled both in figures and words. In case of any discrepancy between the two, the value provided in words shall be treated as sacrosanct.

9. The work executed against the items would be paid on actual targets achieved basis.

10. DDC shall establish a full-fledged office in Chennai for entire duration of the contract, either on its own arrangement or CMRL may provide available space at Vadapalani Metro Rail station upon request, at a nominal rate after award of work. The DDC has to develop and maintain the office till their duration of contract and shall handover the same along with non-perishable items, furniture etc. after completion of works.
Schedule of payment

Price Centre A shall be 20% of contract value.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Description of Major items/ Portion of DDC works</th>
<th>Percentage Distribution of Price Centre A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contractual Submissions</td>
<td></td>
</tr>
<tr>
<td>1 (A)</td>
<td>Performance Guarantee</td>
<td>0.25%</td>
</tr>
<tr>
<td>1 (B)</td>
<td>Submission of PII</td>
<td>0.25%</td>
</tr>
<tr>
<td>1 (C)</td>
<td>Submission of BG for Mobilization advance,</td>
<td>0.25%</td>
</tr>
<tr>
<td>1 (D)</td>
<td>Any other submission</td>
<td>0.25%</td>
</tr>
<tr>
<td>2</td>
<td>General Items</td>
<td></td>
</tr>
<tr>
<td>2 (A)</td>
<td>Design submission rolling programme</td>
<td>1%</td>
</tr>
<tr>
<td>2 (B)</td>
<td>Mobilization schedule for all personnel</td>
<td>1%</td>
</tr>
<tr>
<td>2 (C)</td>
<td>Setting up of design office at Chennai</td>
<td>1%</td>
</tr>
<tr>
<td>2 (D)</td>
<td>Monthly reports &amp; other documents</td>
<td>1%</td>
</tr>
<tr>
<td>2 (E)</td>
<td>Design Basis Report along with outline design criteria for all disciplines, Design statements etc.</td>
<td>1%</td>
</tr>
<tr>
<td>2 (F)</td>
<td>Quality Assurance Plans</td>
<td>1%</td>
</tr>
<tr>
<td>2 (G)</td>
<td>Submission of all software and licenses used for design works, in the Name of Employer</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>Survey and Alignment</td>
<td></td>
</tr>
<tr>
<td>3 (A)</td>
<td>Review and Design of Vertical and Horizontal Alignment and submission of report</td>
<td>5%</td>
</tr>
<tr>
<td>3 (B)</td>
<td>Submission &amp; approval of Topo plan, GIR, EBS, PDA, I&amp;M plan and mitigation measures</td>
<td>20%</td>
</tr>
<tr>
<td>3 (C)</td>
<td>Proposal submission of traffic management, traffic diversion plans etc.</td>
<td>5%</td>
</tr>
<tr>
<td>4</td>
<td>Submission and approval of Conceptual Layout planning of all elevated &amp; underground stations, viaducts, tunnels, ramps and depot works, tracks, MEP, TVS, VAC etc. while ensuring seamless integration with the existing Chennai Metro Rail Network</td>
<td>25%</td>
</tr>
<tr>
<td>5</td>
<td>Development, submission and approval of Interface management scheme in the form of Matrix covering all clauses under scope of work for civil, tracks, TVS, VAC, MEP architectural works etc.</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Proposal, submission and approval of contracting strategies, packaging of different works contract including UG, elevated, depot, MEP, finishes, TVS, VAC, tracks etc. assisting Employer/Employer's representative in tendering works etc.</td>
<td>10%</td>
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<tr>
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</tr>
<tr>
<td>7</td>
<td>Submission and approval of necessary technical documentation and presentations to assist Employer/Employer’s Representative for obtaining necessary approvals for Station designs, Station layouts (including PD area), track supporting structures, MEP facilities, fire detection/suppression system, etc. from the relevant approving authorities like Fire Service, Traffic Police, Commissioner of Metro Rail Safety (CMRS), CMWSSB, TNEB, Tamil Nadu Pollution Control Board, Heritage Conservation Committee (HCC), Railways, Research Design Standards Organization (RDSO) etc.</td>
<td>10%</td>
</tr>
<tr>
<td>8</td>
<td>Submission and approval of various reports such as monthly report, final completion report, Acoustics report, green building implementation report and any other report as and when required by Employer/Employer's representative.</td>
<td>5%</td>
</tr>
<tr>
<td>9</td>
<td>Proposal submission &amp; Approval of BIM Execution plan till the end of the project.</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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</table>
Schedule of payment

Price Centre B shall be 80% of contract value.

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Description of Major items/ Portion of DDC works</th>
<th>Percentage Distribution of Price Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (A)</td>
<td>Presentation of overall conceptual scheme for all disciplines and submission of station planning report, space matrix, design option studies, optimization suggestions etc.</td>
<td>2%</td>
</tr>
<tr>
<td>1 (B)</td>
<td>Approval of 1 (A) by Employer/ Employer’s Representative</td>
<td>3%</td>
</tr>
<tr>
<td>2 (A)</td>
<td>Development and submission of preliminary civil, structural, architectural, finishes tracks, MEP, TVS, VAC designs, drawings, specifications, reports, BIM deliverables (available online to all stakeholders) etc. based on approved conceptual designs. Identification and submission of report pertaining to potential Property development areas within station structures including financial viability report of the proposals.</td>
<td>2%</td>
</tr>
<tr>
<td>2 (B)</td>
<td>Approval of 2 (A) by Employer/ Employer’s Representative</td>
<td>3%</td>
</tr>
<tr>
<td>3 (A)</td>
<td>Development and submission of Definitive design and drawings with BIM deliverables (available online to all stakeholders) with Lead Design Checker/s (LDC) certificate (civil, structural, architectural, finishes, tracks, MEP, TVS, VAC) of all elements including signage, space proofing drawings, fitouts (tunnels/ viaducts as applicable), allied structures, etc. including fire detection, fire suppression, fire compartmentation etc.</td>
<td>10%</td>
</tr>
<tr>
<td>3 (B)</td>
<td>Approval of 3 (A) by Employer/ Employer’s Representative</td>
<td>5%</td>
</tr>
<tr>
<td>4 (A)</td>
<td>Development and submission of construction reference drawings with BIM deliverables (available online to all stakeholders) with Lead Design Checker/s (LDC) certificate (civil, structural, architectural, finishes, tracks, MEP, TVS, VAC) of all elements including signage, track supporting structures, fitouts (tunnels/ viaducts as applicable), allied structures etc. including fire detection, fire suppression, fire compartmentation etc.</td>
<td>5%</td>
</tr>
<tr>
<td>4 (B)</td>
<td>Approval of 4 (A) by Employer/ Employer’s Representative</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Submission of Tender drawings, BOQ, Cost estimate, specifications and all other necessary documents needed for floating the tenders by the Employer for each approved contract package.</td>
<td>10%</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>5 (B)</td>
<td>Approval of 5(A) by Employer/ Employer’s Representative</td>
<td>5%</td>
</tr>
<tr>
<td>6 (A)</td>
<td>Submission of Combined Services Drawings (CSD) Structural Electrical Mechanical (SEM) drawings, final CFD, final SES, with BIM deliverables (available online to all stakeholders) with LDC certificate</td>
<td>5%</td>
</tr>
<tr>
<td>6 (B)</td>
<td>Issue of no objection certificate by Employer/ Employer’s Representative to SEM, SOD, wall CSDs, Floor CSDs, Ceiling CSDs, SOD in item 6 (A) above.</td>
<td>5%</td>
</tr>
<tr>
<td>7</td>
<td>Submission of Detailed designs of Multi-modal integration (MMI) schemes, final road restoration, site-reinstatement and landscaping plans along with Lead Design Checker’s Certificate (LDC)</td>
<td>5%</td>
</tr>
<tr>
<td>8</td>
<td>Submission of Good For Construction (GFC) drawings.</td>
<td>10%</td>
</tr>
<tr>
<td>9 (A)</td>
<td>Interaction with all the stakeholders and submission of report for explanation of design basis, codes, standards, practices followed, calculations, presentations, BIM support during construction phase etc. as per CMRL requirement, trainings, and hands on experience on software for CMRL personnel on a continuous basis till the end of the project. Minutes of meetings to be included in monthly report.</td>
<td>5%</td>
</tr>
<tr>
<td>9 (B)</td>
<td>Approval of 9 (A) by Employer/ Employer’s Representative</td>
<td>5%</td>
</tr>
<tr>
<td>10</td>
<td>Any other design modifications due to site constraints, design changes, interfacing contractors’ requirements, etc. on a continuous basis till the end of the project required for the completion of the work.</td>
<td>10%</td>
</tr>
<tr>
<td>11</td>
<td>Review and issue of design conformity certification of “As-Built drawings” submitted by the contractor</td>
<td>5%</td>
</tr>
</tbody>
</table>

Note * The items stated in 8,9,10 & 11 shall be paid only during the construction stage of corresponding contract packages on a monthly pro-rata basis upon raising the same through monthly interim payment applications (Running Bills) along with necessary documentations and after approval of the same by the Employer/ Employer’s representative.

**TOTAL** 100%
## PROFORMA FOR STATEMENT OF MINOR DEVIATIONS

1. The following are the particulars of minor deviations from the requirements of the Tender Document:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Clause</th>
<th>Deviations</th>
<th>Price adjustment for each deviation/s</th>
</tr>
</thead>
</table>

**Note:**

1. The Tenderer shall indicate price adjustment against each deviation. This price is the price which the tenderer shall reduce from this tender price if deviation(s) is/are accepted by the Employer.

2. Where there is no deviation, the statement should be returned duly signed with an endorsement indicating ‘No Deviations’. In case, Performa of deviations is not submitted or submitted as blank, it will be construed that the tenderer has not proposed any deviations from tender documents.

3. If the tenderer proposes deviations in tender documents, and/or any other terms and conditions of the tender, other than in this Annexure, it will have no effect.

Signature of authorized signatory on behalf of tenderer
“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE CIVIL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS & DEPOT WORKS FOR THE SECTION OF MADHAVARAM MILK COLONY TO THOUSAND LIGHTS EAST AND MADHAVARAM DEPOT, FOR PHASE-II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION 7

CONDITIONS OF CONTRACT (PART-I)
GENERAL CONDITIONS OF CONTRACT

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONNAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
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<td>55.</td>
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</tr>
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1 DEFINITIONS

The following words and expressions shall have the meanings assigned to them except where the context otherwise requires:

(i) “PROJECT” means the project/work named in Conditions of Contract.

(ii)“SERVICES” means the services to be performed by the Detailed Design Consultant pursuant to this contract as may be amended from time to time.

(iii) “EMPLOYER” means the Chennai Metro Rail Limited (also referred to as the “CLIENT” or “CMRL”) which expression shall also include their legal successors and permitted assigns.

(iv) “DETAILED DESIGN CONSULTANT” (Consultant) means the professional firm, individual, party or the group named in the Agreement, who has been engaged by the Client to perform the services, and which expression shall include his/their legal successors and permitted assigns.

(v) “SUB-CONTRACTOR” means the sub-consultant appointed by Consultant with the prior approval of the Employer and in accordance with the procedure described in General Conditions of Contract.

(vi) “MEMBER” in case the consultant comprises more than one entity; means any of the entities, “Members” means all the entities.

(vii) “PARTY” means the Employer or consultant as the case maybe and “Parties” means both of them. “Third party” means any other person or entity as the context requires.

(viii) “CONTRACT” means the Contract Agreement, other documents which are listed in the contract Agreement.

(ix) “ENGINEER IN CHARGE” means the person-in-charge appointed by the Employer to to supervise the detailed design consultancy works or any of its officers nominated by Client and notified from time to time.

(x) “TIME FOR COMPLETION” means the time period stated for this purpose in the Contract data.

(xi) “DAY” means the period between any one midnight and the next.

(xii) “MONTH” means a period of one month according to the Gregorian calendar commencing with any day of the month.

(xiii) “RUPEES” means the currency of India and shall be the currency used for the Project.

(xiv) “APPLICABLE LAW” means the laws and any other instruments having the force of law in the Client’s country, or in such other country as may be
specified in the contract data & Specific Provisions, as they may be issued and in force from time to time.

(xv) “EFFECTIVE DATE” means the date on which this Contract comes into force and effect or the date of issue of Letter of Acceptance.

(xvi) “EXPERTS” means, collectively, Key Experts, Non-Key Experts, or any other professional personnel of the Consultant, Sub-consultant or JV member(s) assigned by the Consultant to perform the Services or any part thereof under the Contract.

(xvii) “STAKEHOLDERS” include Southern railway, Chennai Corporation, CMDA, CMWSSB, TNEB, CPCB, TNPCB, TNFRS, Traffic, Police, Highways, various other departments of TN Govt., Central government departments, interface contractors etc.

(xviii) “LOCATION” is the place from where the consultant shall conduct the performance of services, as the Client may approve from time to time.

2 INTERPRETATION

2.1 The headings are inserted for ease of reference only and shall not form part of nor be used in the interpretation of these Conditions.

2.2 The words importing the singular shall include the plural and vice versa, words importing a gender shall include other genders. A reference to a person shall be construed as a reference to an individual, firm, body corporate or other entity (whether incorporated or not), or, where a position is nominated, the individual occupying that position.

2.3 References to “Contract” mean this contract (and include the Schedules). References to “Clauses” and “Schedules” mean clauses of and schedules to this Contract. The provisions of the Schedules shall be binding on the parties as if set out in full in this Contract.

2.4 References in this Contract to statutory provisions include all prior and subsequent enactments, amendments and substitutions relating to that provision and to any regulations made under it.

2.5 If there is a conflict between provisions of the Agreement and the conflict is not the result of a variation agreed, priority of documents as mentioned shall prevail.

2.6 If there is a conflict in the interpretation of the provisions/ clauses of Agreement, interpretation of CMRL shall be final.
3 LANGUAGES AND LAW

Languages of the agreement/contract communication shall be English. The agreement shall be interpreted, constructed and governed by laws of India. Design Consultant shall, at all times in its performance of its obligations under this Agreement, be responsible to comply with all the Applicable Laws, including, without limitation, those rules or regulations enacted or issued by the Employer.

4 INFORMATION

The Employer shall within a reasonable time to give to consultant, free of cost, available information which he is able to obtain and which may pertain to the Services. But this shall not relieve the responsibility of consultant to collect all the necessary information from other organizations, agencies etc. to the execution of the works assigned.

5 DECISIONS

On all matters properly referred to it in writing by consultant, the Employer shall give a decision in writing within a reasonable time.

6 ASSISTANCE

While it shall be primary responsibility of the consultant to obtain necessary information from other organization to execute the contract, the Employer shall assist consultant in:

6.1 Obtaining access wherever it is required for the Services.
6.2 Obtaining access to other organizations for collection of information.

7 AGREEMENT EFFECTIVE DATE

Letter of Acceptance shall be deemed to be binding contract between the employer and consultant till the agreement is executed.

The contract shall come into effect from the date of issue of the Letter of Acceptance (LOA) or the date as mentioned in the LOA, whichever is later.

8 COMMENCEMENT AND COMPLETION

8.1 The date of commencement shall be 15 days from the date of issue of Letter of Acceptance by CMRL or the date mentioned in the Letter of Acceptance, whichever is later.
8.2 The services shall commence and complete at the times or within the period stated in the Service/Contract/Agreement subject to extensions in accordance with the agreement.

8.3 Completion of the Activities/services of the consultant shall be certified upon final submission of all the documents/manuals, designs, drawings covered in the scope of this contract. If all the documents/manuals have been satisfactorily submitted, the Employer/ Employer’s Representative shall issue the Completion Certificate on the day as mentioned in contract data.

9 NOTICES

If a Party becomes aware of an error or defect of a technical nature in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

The Contractor shall promptly give notice to the Employer of specific probable future events or circumstances which may adversely affect the work or increase the Contract Price or delay the execution of the Works. The consultant is required to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal within 7 days after issuing the Notice.

If the consultant considers himself to be entitled to an extension of the Time for Completion for inordinate delays attributable to the Employer or additional cost for complying with the Employer instructions, the consultant shall give notice to the Employer with all justifying particulars necessitating such claims within 14 days from the occurrence of such event. The Employer shall respond to such notice within reasonable time after examining the claims on merits followed by determination of time extension due and/or additional payments due, if any on the basis of merit, for the consultant. The decision of employer/ employer's representative will be final and binding in this regard.

If the consultant fails to carry out any obligation under the contract, the Employer may by Notice, require the consultant to make good the failure and to remedy it within a specified time mentioned in the notice.

Notices under the Agreement shall be in writing and will take effect from receipt at the address stated in the Agreement. Delivery can be by hand or facsimile message or electronic mail against a written confirmation of receipt or by registered letter or by telex and subsequently must be confirmed by letter.
10 PRESS / MEDIA RELATIONS

10.1 Under any circumstances, no employee of the consultant shall, except with written sanction of the Employer, participate in a radio/TV broadcast or contribute to any article or write any article or letter either in his own name or anonymously, pseudonymously, or in the name of any other person, to any newspaper or periodical.

10.2 The CMRL policy regarding responding to Press/Media shall be enforceable on all parties associated with this agreement.

11 SUBMISSION OF PROGRAMME

The consultant shall submit programmes and Schedules including detailed breakup of activities for the lump sum payment as per contractual provisions for approval by CMRL within 30 days of issue of LOA and update them regularly (every 60 days) to assist the Employer in tracking the progress of works. These programmes and schedules are for Employer’s use only.

12 EQUIPMENT AND FACILITIES

12.1 The Consultant shall secure for itself and its employees all equipment, transport facilities and services that may enable it to perform its obligations under the contract.

12.2 The Consultant shall at all times give to the Employer or to any other persons authorised in writing by the Employer, access to premises occupied by the Consultant where the Consultancy Services are being undertaken and shall permit those persons to inspect and audit the performance of the Consultancy Services and any Contract Material or other material related to the Consultancy Services.

13 PROVISION OF CONSULTANCY SERVICES

13.1 The Consultant shall:

(i) Inform itself of the Employer’s requirements in respect of the Consultancy Services;
(ii) Consult regularly with the Employer throughout the performance of the Consultancy Services; and Act professionally at all times in the performance of the Consultancy Services, exercising the skill, care, economy, efficiency and due diligence in accordance with generally accepted professional standards & practices, and shall observe sound
management practices and employ appropriate technology, safe and
effective equipment, materials and methods.

(iii) The consultant shall always act in respect of any matter relating to this
contract or to the services as a faithful advisor to the client and shall at
all times support and safeguard the client’s legitimate interests in any
dealings.

(iv) The consultant shall provide professional, objective and impartial
advice and at all times hold the Employer’s interests paramount.

(v) Consultant shall propose, employ and provide such qualified and
experienced experts and sub-consultants as are required to carry out
the services.

13.2 CODE OF PROFESSIONAL ETHICS

(i) The consultant shall have no direct or indirect interest in commercial,
manufacturing or contracting activities that might tend to influence its
professional judgement. It is remunerated solely by the fees paid to it
by CMRL.

(ii) It shall approach all assignments objectively and by using sound
technical and economic principles provide solutions, which serve the
best interests of CMRL.

(iii) The consultant shall give a declaration that its firm has no financial or
managerial ties with other organisation that could influence its
independence.

14 PERFORMANCE STANDARDS

14.1 All services performed under this Agreement shall be performed by
the Consultant and its Sub-Consultants in a manner consistent with
(a) the latest Indian and International standards and codes applicable
for projects of the type, scope and complexity of the Project and also
applicable to those who provide similar services; (b) the Applicable
Laws; (c) the terms of this Agreement; and (d) using their
professional
skill and judgment.

14.2 You are required to comply with the Employer’s Policies and
Procedures as may from time to time be in force.

14.3 Notwithstanding any review of its organization structure, staff or
manning schedules, the DDC shall remain wholly responsible for
providing the services.

14.4 If, in the opinion of the Employer/Employer’ Representative, the
progress or performance of the DDC’s work is seen to be at any time
inadequate to meet those requirements, the DDC shall take the necessary steps to improve them on being so notified.

14.5 If within a reasonable period the DDC has not improved its progress or performance, the Employer/Employer’ Representative may by written notice require it to take additional measures, including changes in its organization, at no additional cost to CMRL Such notice shall be in no way deemed to constitute a waiver of Employer/Employer’ Representative’s rights to terminate the Agreements by reason of the DDC’s breach of contract.

14.6 Failure by the Employer/Employer’ Representative to issue such a notice shall not relieve the DDC of its obligation to achieve the required rate of progress and quality of work.

15 ADDRESSING AMBIGUITIES

To the extent there are any ambiguities and/or conflicting terms and provisions as between the Design Consultant’s Proposal and this contract, this contract shall control and govern.

16 Care and Supply of Documents

The Specification and Drawings submitted shall be in the custody and care of the Employer. The Consultant shall keep, on the location, a copy of the Contract, publications named in the Specification, the Documents and Drawings and Variations and other communications given under this Contract. The Employer’s Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Consultant from any responsibility he has under this Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

17 Delayed Drawings/ Submissions

The Consultant shall give notice to the Employer whenever the Works are likely to be delayed or disrupted to the extent that any necessary drawing could not be issued to the Contractor within a particular time, which shall be
reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and the nature and amount of the delay or disruption likely to be suffered if it is late.

If the Contractor suffers delay and/or incurs Cost as a result of a failure of the consultant to issue the notified drawing within a time which is reasonable and is specified in the notice with supporting details, the Contractor’s claim in this regard shall be assessed case to case basis and charged in accordance with consultant’s responsibility for the delay.

18 LIABILITY OF CONSULTANT TO THE EMPLOYER

Consultant shall be liable to the Employer till the issue of the Performance Certificate. The Employer shall issue Performance Certificate to the consultant after the completion of duration of professional liability.

The consultant shall be issued Performance Certificate by the Employer stating that the consultant has completed his obligation to the Employer’s satisfaction. Only the issue of Performance Certificate shall be deemed as fulfilment of consultant’s obligations with respect to this contract subject to clause 21.

Consultant shall only be liable to pay compensation to the Employer arising out of in connection with the Agreement for a breach of Contract. Such compensation shall be limited to the amount specified against limitation of Liability mentioned in Conditions of Contract.

19 COMMUNICATIONS

19.1 The Design Consultant shall comply with all written procedures, issued by the Employer from time to time, for conduct of communications to deal with matters relating to the planning, programming, design and construction of the Project.

19.2 After every meeting, the consultant shall prepare Minutes of Meeting and submit to the Employer for approval and circulation to other parties.

20 TAXES AND DUTIES

20.1 The consultant shall ensure full compliance with the tax laws of India with regard to this contract and shall be solely responsible for the same. He shall submit copies of acknowledgements evidencing filing of returns every year and shall keep the Employer fully indemnified against any liability of tax, interest, penalty, etc. of the consultant’s in respect thereof, which may arise.
20.2 The consultant shall maintain complete records in respect of payments made for taxes, duties, GST, octroi and other levies payable to various authorities and shall advise the Employer of the complete details of such compliance and payments every month, which shall be enclosed with the Monthly Progress Report. These records shall remain open for Inspection by the Employer at any time and shall be made available to them as and when required.

20.3 The consultant and their personnel shall pay such taxes, duties, fees and other impositions as may be levied under the Applicable Laws, the amount of which shall be deemed to have been included in the Contract Price (Contract Price should be fixed excluding GST, which shall be reimbursed by the Employer based on documentary evidence of actual payment of the same).

20.4 In case the Employer receives approval for exemption, refund, waiver or reimbursement in any of the taxes applicable to the Contract, the consultant will be advised on the process to be followed to obtain such exemption/refund/reimbursement of such taxes etc. from the concerned authority. The consultant shall arrange for the remittance of the refund so obtained to Employer immediately. Alternatively, the Employer at its discretion may instruct the consultant to submit all documentary evidence of having paid the taxes to enable the Employer to claim the refund from statutory authorities.

21 DURATION OF PROFESSIONAL LIABILITY

Consultant shall not be considered liable for any loss or damage resulting from any occurrence unless a claim is formally made on him before the expiry of the insurances stated in the Conditions of Contract, i.e., two years from the date of issue of completion certificate or such date as may be prescribed by law, whichever is later.

22 CHANGE IN LEGISLATION

Changes in the rate of existing tax relevant to the contract, 15 days prior to the due date of submission of the tender, will be considered a Change in Legislation. Such additional or reduced cost shall be certified by the Employer after examining the records provided by the consultant and shall be paid by or credited to the Employer accordingly.

23 CONFLICT OF INTEREST
Unless otherwise agreed in writing by the Employer, the consultant and his personnel shall have no interest in nor receive remuneration in connection with the Project except as provided for in the Agreement.

The consultant shall take all reasonable measures to ensure that its employees, agents and subcontractors do not, during the Contract, engage in any activity or obtain any interest which is in conflict with providing the Consultancy Services to the Employer fairly and independently.

The consultant has an obligation and shall ensure that its experts and sub-consultant shall have obligation to disclose any situation of actual conflict that impacts there capacity to serve the best interests of the employer. Failure to disclose said situations may lead to termination of its contract.

On receipt of a notice of conflict of interest, the Employer may decide upon the action to be initiated. Employer reserves the right to suspend services of consultant or to proceed to termination, as necessary.

24 CORRUPTION AND FRAUD

The consultant shall neither give, provide, or offer nor shall receive, ask or accept, any loan, fee, reward, gift or any emolument or advantage whatsoever beyond the provisions of this agreement.

Wherever possible, any issues relating to conduct, competence and behaviour should be identified and resolved internally but the Employer should kept informed of such occurrences.

In order to prevent and detect fraud, the Employer may at any time:

a) Share information about the consultant with other organizations including the police, vigilance, etc.

b) conduct/allow the Law Enforcement officials to conduct searches of the consultants’ premises

c) Check and share your details with fraud prevention and detection agencies, as may be necessary.

In the event of any breach of this condition, the Consultant shall be deemed to have breached the contract and the Employer shall, without prejudice to any other rights the consultant, it may possess, be at liberty forthwith to terminate this contract and to recover from the consultant any loss or damage resulting from such termination.
However, should the Employer consider that your conduct or behaviour may be in breach of code of conduct, or that your professional competence has been called into question, Notice may be issued to the consultant requiring explanation in this regard but the consultant will be liable to pay compensation to the Employer if the breach is established.

In the event of termination on such grounds, the Employer is also entitled to recovery of any additional expenses incurred for preceding the work till completion.

25 PUBLICATION

Consultant, either alone or jointly with others, cannot publish, disclose or divulge any material relating to the Services or Project to any third party without the written permission from the Employer.

The consultant shall implement appropriate technical and organisational measures to protect the Data/Information regarding the project against unauthorised or unlawful processing and against accidental loss, destruction, damage, alteration or disclosure.

26 SCOPE OF SERVICES PERFORMED BY THE CONSULTANT

26.1 The Employer has endeavored to delineate the scope of the Services to be provided by Detailed Design Consultant. Such descriptions are not intended to be comprehensive. The Design Consultant shall be required, without adjustment or addition to the fixed rates or maximum compensation agreed to herein, to provide any services, 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 out in this contract.

26.2 Interface

Where the Services include the co-ordination between the consultant and other consultants and Contractors employed on the Project from time to time, the consultant shall provide such co-ordination. The consultant shall obtain, co-ordinate and submit to the Engineer-in-charge for his information and approval all details, drawings, arising from such co-ordination with others. Such co-ordination will take place throughout the contract period and it shall be the responsibility of the consultant to document the same.
26.3 Value Engineering

Detailed design consultant shall propose and provide innovative solutions for design optimization, at any time, which in the Consultant's opinion will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Consultant; the proposed concepts after suitable iterations and fair exchange of technical informations based on their past experience in design of metro systems substantiated with the latest codes & standards and design practices, should be presented to the design teams and Management of CMRL before the commencement of relevant works.

Detailed design consultant is entrusted with the prime responsibility and accountability for the improvement of the design solutions as the case may be after diagnosing any flaw in their design and should substantiate in writing any quality and safety aspects found missing/unaddressed at any stage of design and construction work at any point of time at their own cost.

27 REPRESENTATIVE

For the administration of the Agreement, the consultant shall designate an official or individual to be his representative, with necessary knowledge of the design and construction works. This person shall be designated as Project Manager and shall attend all meetings with the Employer. The Project Manager will be responsible for planning, organizing and securing resources for ensuring the successful completion of the project by coordinating with different teams to develop a coherent output through the coordination of various interfaces. All communications from the Employer shall be addressed to the Project Manager.

28 DEPLOYMENT/REPLACEMENT OF PERSONNEL

28.1 All persons employed by Design Consultant shall be the employees of Design Consultant and not of CMRL. Design Consultant shall be solely responsible for any workers' compensation obligations, withholding taxes, unemployment insurance, all statutory obligations and any other Employer obligations with respect to all employees working for Design Consultant.

28.2 The Consultancy Services shall be performed by the key personnel nominated in the Proposal and no substitution of personnel so nominated shall be made without the Employer's consent. The personnel so nominated shall be competent and shall have the necessary skills to perform the Consultancy Services on which they will be engaged.
28.3 The Qualifications and experience of all personnel, who are assigned by consultant to work on the Project, shall be submitted to the Employer for approval prior to deployment.

28.4 The Schedule of Manning with details including number of personnel necessary to complete the works as per the Agreement shall be submitted by the consultant upon award of the work. The Employer reserves the right to penalize for non-deployment of man-power as agreed in contract agreement. The penalty for non-deployment of key persons will be penalized as per schedule mentioned in contract data.

28.5 If it is necessary to replace any person of consultant, the latter shall immediately get the approval of the Employer to arrange for replacement by a person of comparable competence.

28.6 If Employer/employer’ Representative decides that continuation of any person is not in the interest of the project, a written notice will be given to Consultant who will promptly replace the person within a week.

28.7 If the Employer is dissatisfied with the services rendered by any Personnel, Consultant shall promptly recommend a substitute person. Consultant shall do so at its own expense.

28.8 Where any of the nominated personnel are unavailable to perform any of the Consultancy Services allocated to them, the Consultant shall immediately -

(i) notify the Employer in writing; and

(ii) if so requested by the Employer, arrange for replacement of that person with a person satisfactory to the Employer (who will become the nominated personnel) at no cost to the Employer.

(iii) If a key personnel or sub-Key personnel are not available more than 15 days in a month, due to leave or sickness, an amount of Rs. 50,000 will be deducted from consultant’s payment.

29 ASSIGNMENT AND SUB-CONTRACTS

29.1 The consultant shall not, without the written consent of the Employer, assign the benefits from the Agreement other than money.

29.2 The consultant shall not assign obligations under the Agreement (to Sub-Consultant / Sub-Contractors) without the written consent of the Employer.
29.3 The consultant shall not without the written consent of the Employer, assign or terminate any personnel or sub-contractor for performance of all or part of the Services.

30 SUPPLY OF CLIENT’S PERSONNEL

30.1 In consultation with the consultant, the Client may provide personnel in his employment to the consultant, when necessity arises. The deployment of the Client’s personnel shall be subject to the acceptance of the consultant and such acceptance shall not be unreasonably withheld.

30.2 The Client’s personnel so deployed shall take instructions only from the consultant till they have been reverted to their services with the Client after written communication to this effect.

31 PERFORMANCE GUARANTEE

31.1 As stated in the ‘Instruction to Bidders’ (ITB-Clause 14.3) the consultant shall provide the Employer with a Performance Guarantee in the form of Bank Guarantee provided by a Indian branch of Public Sector Undertaking (PSU) Bank based in India that is acceptable to the Employer.

31.2 The Employer reserves the right to forfeit the performance guarantee amount, in the event of termination of the contract arising due to the breach of the contract by the consultant.

31.3 In the event of any defect coming to the notice of the Employer within the period of 24 months from ‘the issue of completion certificate’ as mentioned in clause 8.3 above and in the eventuality of the consultant failing to rectify the same, the consultant will forfeit the amount of the Performance Guarantee.

32 CHANGE IN PERSONNEL

32.1 Change in personnel assigned as “Key-personnel” after they have been approved by the Employer, shall be allowed only twice during this contact period for each position. Penalty (as stated in contract data) will be levied for any violation.

33 CHANGE IN CONSTITUTION

Consultant shall promptly notify and obtain the approval of the employer for any changes in the constitution of the consultant. It shall be open for the Employer to terminate the Agreement upon change in the constitution of the consultant. It
shall be open for the Employer to terminate the Agreement upon death, retirement, insanity or insolvency of any person being the proprietor/partner in the consultant, or on the addition or introduction of a new partner managing the Project for the consultant without the previous approval in writing of the Employer.

But in absence of and until its termination by the Employer as aforesaid, this Agreement shall be in full force and effect, notwithstanding any changes in the constitution of the firm by death, retirement, insanity or insolvency of any of its proprietors/partners or addition or introduction of any new partners. In case of death or retirement, the surviving or remaining partners of the firm shall be jointly and severally liable for the due and satisfactory performance of all terms and conditions of the Agreement, and likewise on the addition of a new partner, the latter will also become jointly and severally liable.

34 PROFESSIONAL INDEMNITY INSURANCE (PII)

The consultant shall effect and maintain Professional Indemnity Insurance (PII) for the amount in Indian Rupees equal to twice the contract value payable to consultant, with unlimited number of incidents in respect of design and services to be carried out by, or on behalf of consultant valid from the date of commencement till 2 years after the date of issue of completion certificate as mentioned in clause 8.3 above, to the consultant.

PII Policy shall be obtained within four weeks from ‘date of commencement’ and before any payment is released to Consultant. The consultant shall produce evidence of coverage of the Professional Indemnity Insurance before any payment is released. The insurance which shall ensure the consultant’s liability by reason of professional negligence and errors in the design of the works shall be valid from the date of commencement of works. The Employer will not issue final payment certificate until the consultant has produced evidence that coverage of Professional Indemnity Insurance has been provided for the aforesaid period. It is a deemed accepted condition of contract that the DDC indemnifies and save harmless CMRL from and against all claims and proceedings on account of infringements of patents rights, design, trademark name etc. In the professional indemnity insurance policy the deductible amount shall not be more than 5% of AOA (Any one accident) limit.

The Employer reserves the right to request for additional cover to meet any specific additional liability and consultant shall insure or increase any other insurance required by the Client.
35 MODIFICATIONS AND VARIATIONS

35.1 The Contract can be modified including modification in Contract Amount and Scope, in writing by employer. In the event of any additional services to be performed by consultant, the consultant shall obtain prior written approval from the Employer, on the time and cost involved in performance of the additional services.

35.2 The agreement scope may be subject to variations including omissions, alterations and additions. If a variation to the scope of works results in a change in the agreement value (positive or negative changes), the financial implications will be calculated by the consultant, subjected to the acceptance by the Employer using the original project specification, price center and scope of works as a basis.

35.3 If the Employer requests for variation, consultant has to submit the proposal.

35.4 Consultant may be entitled for extension of time or additional payments on the basis of merits of the variations proposal in accordance with determination by Employer in this regard.

36 COPYRIGHT

The copyright (including future copyright) of all documents and drawings prepared by the consultant, including each and every stage of design and production thereof, in performance of the Services under the Agreement shall be vested with the Employer. All Design Documents prepared by the Design Consultant and its Sub contractors, the designs depicted in them, and any presentation materials, shall become, upon their creation, the property of CMRL whether the Project for which they are made is executed or not. Without limitation to the foregoing, CMRL shall hold, and Design Consultant shall be deemed to have been irrevocably assigned to CMRL in perpetuity with no reserved or retained rights in any other persons or entities, all copyrights or other intellectual property rights relating to the Design Documents.

37 CONSULTANT’S WARRANTY OF DESIGN

37.1 The Consultant shall be fully responsible for the suitability, adequacy, integrity, durability and practicality of the consultant’s proposal.

37.2 The Consultant warrants that the Consultant’s Proposals meet the Employer’s Requirements and is fit for the purpose thereof.
37.3 The Consultant warrants that the design is suitable for the site implementation. The Consultant shall indemnify the Employer against any damage, expense or claim which the Employer might be subject to by the executing contractor arising from implementation of the design. In such events, the consultant shall address or rectify such inadequacy, insufficiency, impracticality or unsuitability at their own cost. The consultant shall monitor the design implementation and record any revisions issued and submit monthly for Employer’s review.

37.4 Where there is any inadequacy, insufficiency, impracticality or unsuitability in or of the Employer’s Requirements or any part thereof, the Consultant’s Proposal shall take into account, address or rectify such inadequacy, insufficiency, impracticality or unsuitability at their own cost.

37.5 The Consultant warrants that the Works have been or will be designed to the highest standards available using proven up-to-date good practice.

37.6 Design Consultant is responsible for the safety of the design of the Project and for the interpretation of and any necessary amplification of the Drawings and Specifications prepared by it or its Sub consultants for the purpose of implementation of the Project.

37.7 The Consultant shall indemnify the Employer against any damage, expense, liability, loss or claim which the Employer might incur, sustain or be subject to arising from any breach of the Consultant’s design responsibility, any claim related to intellectual property rights and/or warranty set out in this Clause.

37.8 The consultant further is deemed to have checked and accepted full responsibility for ‘the Consultant’s Proposal’ and warrants absolutely that the same meets the Employer’s Requirements:

(i) Notwithstanding that such design may be or have been prepared, developed or issued by the Employer, any of Consultant’s consultants, his sub Consultants and/or his qualified personnel/persons or cause to be prepared developed or issued by others.

(ii) Notwithstanding any warranties, guaranties and/or indemnities that may be or may have been submitted by any other person.

(iii) Notwithstanding that the same have been accepted by the Employer’s Representative.
37.7 The consultant shall be fully responsible for the drawings, designs etc. & preparing developing and coordinating all design works to enable that part of the Works to be constructed and/or to be fully operational in accordance with the Contract’s requirement.

37.8 The Consultant shall not be relieved from any obligation/liability under the contract, for any delay, suspension, impediment to or adverse effect upon the progress of the Works due to mistake, inaccuracy, discrepancy or omission in or between the consultant’s the Definitive Design and the final design, or any failure by the Consultant to prepare any Design Data/Drawings or submit the same to the Employer in due time and the Consultant shall promptly make good any such defect at his own cost. The consultant shall not be entitled to any additional payment or extension of time in such cases.

38 PAYMENT TO THE CONSULTANT

38.1 On issue of LOA within 30 days the details of breakup of activities for the lump-sum payment with weightage of payments should be submitted to CMRL for approval.

38.2 The Employer shall pay the Lump Sum Price (which shall cover the sum total of all costs quoted by the Consultant as set out in Contract) to the consultant as Interim Payment Application (IPA) on monthly basis for the performance of services. The consultant shall raise IPA every month.

38.3 The payment shall be based on payment schedules as described in Section 6 (Financial Packages) of tender documents. GST will be paid extra as applicable on submission of documentary proof of actual payment made by the consultant.

38.4 Mobilization Advance:

The consultant shall be eligible for Mobilization Advance up to 5% of the original contract value in two equal installments on receipt of an irrevocable bank guarantee from a PSU Bank in India of the tenderer’s choice. The advance shall bear an interest of 12% over existing market rate. The first installment shall be paid within 30 days after the submission of the bank guarantee. The second installment shall be paid after satisfactory utilization of the first installment of the advance has been confirmed by the Employer. The bank guarantee shall be in an amount in Indian rupees and equal to 110% of the requested Advance amount in the format provided in the ITB.
The bank guarantee shall become null and void when the full amount for the advance payment has been recovered by the Employer.

38.5 Recovery of Advances:

The recovery of advances shall commence after 20% of the original contract value has been paid and will be recovered within 20 months or completion of 85% of the work whichever is earlier, in successive monthly payments.

In consideration of the Consultant duly and properly providing the Consultancy Services in accordance with this Contract, the Consultant will be paid the contract price as consultancy fees set out in the Letter of Acceptance or as amended as per GC 35.

Without limitation, any debt due or other moneys recoverable by the Employer from the Consultant may be deducted or set off from any moneys due or to become due to the Consultant under this Contract.

No additional fees shall be payable to complete the Consultancy Services unless agreed to in writing between the parties to the Contract.

The consultant shall not receive any remuneration in connection with this assignment except as provided in the contract.

38.6 Retention Money:

Retention money of 2.5% of the Interim Payment Certificates shall be held by the Employer without obligation to invest them or account for interest thereon or to place them in a designated account. After the issue of the Performance Certificate, all of the retention money shall become due to the consultant, notwithstanding that at the time there may be outstanding claims by the consultant against the Employer.

Provided that if at that time there remains to be carried out by the consultant any outstanding work, the Employer may withhold payment until the completion of such work or however much of the retention as shall in the opinion of the Employer, represent the expense to the Employer of the work remaining to be executed.

38.7 Interim Payment Application (IPA):

The Consultant may include in an interim payment application any claim for expenses described in the Pricing Schedule, once those expenses have
been incurred by the Consultant with relevant documentation for verifying the claims. The Employer shall reimburse the Consultant for such expenses vide Interim Payment Certificates (IPC) in accordance with the contract.

(i) The consultant will not be entitled to make any claim for payment in respect of any part of or all of the Consultancy Services on Interim Payment Application by the consultant, until the Employer/Employer’s has certified that the relevant Consultancy Services have been performed in accordance with the Contract.

(ii) Each payment claim must include not limited to the following details:

- A full description of the Consultancy Services performed by the Consultant during the Claim Period;
- The Consultant’s calculation of the fees payable to the Consultant by the employer for Consultancy Services provided during the Claim Period;
- Relevant records (including manning details) for calculating the amount of the fees payable for the Claim Period;
- Any adjustments to the fees properly due and payable to the Consultant in the Claim Period;
- Evidence to the satisfaction of the employer that all workers and subcontractors engaged in performing the Consultancy Services have been paid all amounts due and owing to them; and
- Documents including tax invoice for reimbursement of GST (actual) as per provisions of the contract.

(iii) Neither the issue of a payment certificate or payment of moneys shall be evidence of the value of work or an admission of liability or evidence that work has been executed satisfactorily but shall be payment on account only.

39 TIME FOR PAYMENT

The amount due to the consultant, as approved by the Employer, shall be paid within 45 days from the date of certification of the Interim Payment Application (IPA) by the Engineer-in-charge, subject to submission of all necessary documentary evidence for the claims. The Employer shall release payment, for all certified items in the IPA within 45 days from the date of approval. Consultant shall provide additional documents for substantiating their claims, if requested by the Employer.
40 CURRENCY OF PAYMENT

Interim payments will be certified and paid in accordance with the provisions of the contract in the currency shown in the Pricing Document.

41 DISPUTED INVOICES

41.1 If any item or part of an item in an Interim Payment Application submitted by the consultant is contested by the Employer, then the Employer shall give a prompt notice with reasons and shall not delay payment on the balance of the invoice.

41.2 Maximum amount withheld on account of disputed item in any invoice shall not exceed 150% of the value of the disputed item.

41.3 The Consultant shall promptly perform again any Consultancy Service or item thereof certified as not being in accordance with the Contract, without raising additional claims to the Employer.

41.4 The Consultant will not be entitled to make any claim for payment in relation to such services disputed in any invoice until the Employer has certified that the re-performed services are in accordance with the Contract.

42 AUDIT REQUIREMENTS

The Employer reserves the right to carry out a audits and/or examination of the books, and the account, including all supporting vouchers, abstracts, etc., and to make a claim on the consultant for the refund of any excess amount paid to him, if as a result of such examination, any over-payment to him is discovered to have been made in respect of any work done or alleged to have been done by the Contractor, under the Contract. If any under-payment is discovered, the same shall be paid by the Employer to the consultant. Such payments or recoveries, however, shall not be subject to any interest.

The consultant shall provide full and timely access for such Audit by the Employer, including inspection of records and documentation. Such access shall include direct access to the work areas, storage facilities, consultant's project offices, and similar areas and facilities where any work is being conducted for this project.

43 TAX DEDUCTION AT SOURCE

Deduction towards Income Tax, and any other tax, may be made at source from each payment made by the Employer, as may be directed by Income Tax
Department and other statutory bodies or as provided in statute, relevant acts, rules, circulars and directions issued thereunder. Such deductions shall be communicated as part of the Interim Payment Certificate issued by the Employer.

44 CLAIMS FOR LOSS OR DAMAGE

Subject to Clauses 23, any claim for loss or damage arising out of breach or termination of the Agreement may be settled by mutual consultation between the Employer and the consultant, failing which the same shall be referred to dispute resolution in accordance with Clause 56.

Except in the event of the Employer's failure to make undisputed payment of the Compensation due to consultant, notwithstanding any disputes between Employer and consultant hereunder or in connection with the Project, the consultant and the Employer shall each continue to perform their respective obligations hereunder; including the obligation of the consultant to continue to provide and perform services hereunder pending a subsequent resolution of such disputes.

45 EMPLOYER’S CLAIM

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Duration of Liability, the Employer shall give notice and particulars to the consultant. The particulars shall specify the basis of the claim, and shall include details of the amount and/or extension to which the Employer considers him-self to be entitled in connection with the contract. Consultant shall respond to the notice within 21 days failing which the Employer’s claim shall be final and binding on the consultant and construed to be settled.

46 LIMIT OF EMPLOYER’S LIABILITY

The Client shall have no liability in respect of any claim made or any award of compensation in respect of redundancy or unfair or wrongful dismissal to any employee of the Consultant in respect of his or her service with the Consultant or arising from the operation of the Client's policies/security measures.

47 FORCE MAJEURE

47.1 If, at any time during the currency of the Contract, the performance in whole or in part by either party of any obligation under this Contract shall be prevented or delayed by reason of any war, hostilities, invasion, acts of public or foreign enemies, rebellion, revolution, insurrection, civil
commotion, sabotage, large scale arson, earthquake, nuclear accidents, any other catastrophic circumstances or acts of God (hereinafter referred to as “event”) then, provided notice of the happening of such an event is given by either party to the other within 14 days of the occurrence thereof:

(i) Neither party shall by reason of such event be entitled to terminate the Contract or have claim for damages against the other in respect of such non-performance or delay in performance. Only extension of time will be allowed to the extent as determined by the Employer.

(ii) The obligations under the Contract shall be resumed as soon as practicable after the event has come to an end or ceased to exit.

(iii) If the performance in whole or part of any obligation under the Contract is prevented or delayed by reason of the event beyond a period of 90 days, either party may as its option give request for Reimbursement or Extension of Time under the provisions of the contract.

47.2 If neither party issues notice regarding the event within 14 days of its occurrence, the said event shall be deemed not to have occurred and the Contract will continue to have effect as such.

48 DELAYS AND LIQUIDATED DAMAGES

48.1 Time is the essence of the Contract. It shall be the bounden duty of the consultant to strictly adhere to the time for performance of various services indicated in the Contract.

48.2 In case of delays, the consultant shall be liable to pay liquidated damages as given in contract.

48.3 Liquidated damages shall be imposed as per the provisions of Contract as stated in Contract Data.

48.4 The maximum limit of Liquidated Damages shall be 10% of the Fixed Lump Sum Price of the Contract as stated in the LoA.

49 EXTENSION OF TIME

The Consultant shall be entitled to an adjustment to the Project Schedule for unavoidable Delays that are:

(i) beyond the Consultant’s control or its responsibility under this Agreement and/or
(ii) not caused by the fault, negligence or violation of a provision of this Agreement by Consultant or its Sub consultants;

(iii) provided, however, that as a condition precedent to its right to an adjustment of a Project Schedule, Consultant shall have given written notice to the Employer of the circumstances of such delay within fourteen (30) Days after such circumstances were first observed by Design Consultant or its Sub consultants. Employer decision on this regard shall be final and binding.

Failure to provide such written notice may result in a waiver by Design Consultant of any right to an adjustment to that Project Schedule/Payments on account of such circumstances.

Any claim for adjustment in the Contract Price during the Extended Contract Period will only be considered if supported by valid relevant appropriate rates as agreed between the Client and the Consultant, for the period in question.

50 ISSUE OF NOTICE

The Notice shall be given as soon as practicable after the Employer/consultant became aware of the event or circumstances giving rise to the claim.

A notice relating to any extension of the Duration of Liability shall be given before the expiry of such period.

51 RIGHTS AND LIABILITIES OF THE PARTIES

The Client has the right to notify the Consultant that it wishes to modify its requirements in relation to the Project.

Should a party be deemed liable to the other party, by way of indemnity or by reason of breach of contract or otherwise, the Consultant’s liability shall in aggregate not exceeding twice the price of the contract value.

No dispute arising gives either Party the right to suspend their obligations under the terms of this Agreement.

All parties that form part of the consultant shall be jointly and severally liable to the Employer and/or third parties for the execution of the contract.

52 ABANDONEMENT AND SUSPENSION

Should any event occur which prevents the performance of the Services (in whole or in part) required under this Agreement, and then those Services will be
suspended until such time that it becomes practicable to recommence the Services.

In the event that there is a reasonable likelihood that the Services are not able to be recommenced, then this Agreement may be terminated by the Employer.

(i) CMRL may suspend all or part of the Services or terminate the Agreement by notice of at least 30 days to DDC who shall immediately make arrangements to stop the Services and minimize expenditure.

(ii) If CMRL considers that DDC is not discharging his obligations CMRL can inform the DDC by notice stating grounds for the notice. If a satisfactory reply is not received within 07 days of receipt of the notice by DDC, CMRL can by further notice terminate the Agreement provided that such further notice is given within 30 days of the DMRC’s former notice.

(iii) If DDC is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a breach of the Agreement, then CMRL may terminate the Services of the DDC as per the procedure given in Clause 54 below.

CMRL may complete the project by whatever method may be deemed expedient and the DDC shall not be entitled to receive any further payment.

53 CONSEQUENCES OF SUSPENSION

In circumstances where the Services or part of the Services have to be suspended or delayed, the Consultant will be allowed extra time to complete the Services and such extra time should be determined as reasonable in the circumstances. For events of delay on account of the consultant, all costs for the extended period and consequential impact on other services including defect liability period, duration of liability, etc., shall be borne by the consultant.

In the event that the suspension continues for more than 6 months, then this Agreement may be terminated by the Consultant after issuing Notice to the Employer.

54 TERMINATION

The Employer shall notify by issuing notice to correct (NTC) to the consultant when certain breach of terms likes delay, slow progress, etc. are foreseen or has occurred. The consultant shall respond to the NTC within 14 days by stating corrective actions to be taken to address the same failing which the Employer may terminate by issuing a 14 days’ notice of termination.
The merits of the corrective actions against NTC shall be reviewed by the Employer. The consultant shall within 28 days show significant and verifiable effort to correct its performance and provide concrete evidence to the employer of consultant’s willingness and ability to execute the services under this contract. If consultant fails to achieve the above the Employer reserves the right to terminate by issuing a notice of termination.

54.1 Termination by Employer

The Employer shall be entitled to terminate the contract at any time if the consultant:

(i) Fails to comply with any of the contractual requirements;
(ii) Abandons work;
(iii) Fails to proceed with work in accordance with the provisions of the contract;
(iv) Become bankrupt or insolvent;
(v) Commits fraud or tries to obtain undue advantage;
(vi) Failure to adhere to key dates.

On termination, the consultant will be paid in accordance with the provisions of the contract for works executed till the date of issue of Notice of termination, provided that official documents are submitted as proof.

The Employer reserves the right to execute the balance works by any means whatsoever at the risk and cost of the terminated consultant.

54.2 Termination by the consultant

The consultant is entitled to terminate the contract 45 days after issue of Notice under the following conditions:

(i) Prolonged suspension of work without due compensation being paid as mutually agreed;
(ii) When the Employer becomes bankrupt / insolvent.
(iii) Delay of 56 days occurred after the specified period for payment due in accordance with contract except for disputed items in any Invoice/IPC.
55 ADJUDICATION AND ARBITRATION

55.1 Adjudication

(i) If any dispute between consultant and Employer including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, is not resolved through Amicable Settlement, either party to this contract ("the Referring Party") may at any time give notice ("the Notice") in writing to the other party of its intention to refer a dispute arising under the contract to adjudication and request for appointment of Adjudicator.

(ii) The DAB shall comprise of single member (Sole adjudicator). Managing Director of the Employer will give panel of 3 members and the Contractor shall choose any one member to form the DAB. Such adjudicator shall be professional experienced in the relevant field. If any nominated member is an employee of CMRL, he shall not be lower than DGM of CMRL and should have not dealt with this contract.

(iii) The remuneration payable to the adjudicator shall be mutually agreed to by the Parties and shall be shared by both the Parties equally.

(iv) If at any time the Parties so agree, they may jointly refer a dispute or any matter to the DAB for it to give its opinion. Neither Party shall consult the DAB on any matter without the agreement of the other Party.

(v) If any member of the DAB declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be made in the same manner as the replaced person was appointed.

(vi) The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Consultant acting alone.

(vii) The adjudicator shall reach a decision within 60 days of referral or such longer period as is agreed between the parties after the dispute has been referred.

(viii) The adjudicator shall act impartially. The adjudicator may take the initiative in ascertaining the facts based on the contractual provisions. For this purpose, the adjudicator may, in addition to documents already
submitted as part of particulars, call upon additional documents from either party.

(ix) The party which is not satisfied with the adjudication award may apply for arbitration within one month, failing which the decision of the adjudicator shall be final.

55.2 Arbitration

If the efforts to resolve all or any of the disputes through adjudication fail, then such disputes shall be referred within 30 days to Arbitration in accordance with the following provisions:

(i) Matters to be arbitrated upon shall be referred to a sole Arbitrator where the total value of claims does not exceed Rs. 5 Cr. Beyond that claim limit of Rs. 5 Cr., there shall be three arbitrators.

(ii) For those disputes to be decided by sole Arbitrator, the Employer shall send a panel of three serving/retired officers not less than the rank of GM of CMRL or equivalent, out of which the consultant shall choose one, who will be appointed as sole arbitrator.

(iii) For those disputes to be decided by a panel of three Arbitrators, the Employer shall send a panel of five serving/retired officers not less than the rank of GM of CMRL or equivalent. The consultant and the Employer shall choose one arbitrator each and the two so chosen shall choose the third arbitrator from the said panel, who shall act as the presiding Arbitrator of the Arbitration Panel.

(iv) If in a dispute, the consultant fails to select the arbitrator within thirty (30) days after the Employer has furnished the panel, the MD,CMRL may nominate an arbitrator from the panel of arbitrators, for that dispute.

(v) The two chosen arbitrators fail to appoint the third arbitrator within 30 days after they have been appointed, the Employer or the consultant may apply to the Managing Director of CMRL, to nominate the third arbitrator from the panel, for the matter in dispute.

(vi) The arbitration hearings shall be held in Chennai only. The language of the proceedings, that of documents and communications shall be English and the awards shall be made in writing. The arbitrators shall always give item-wise and reasoned awards in all cases where the total claim exceeds Rs. One million.
(vii) On account of adjudication or arbitration proceedings the work shall not be suspended.

(viii) Rules Governing the Arbitration Proceedings

The arbitration proceedings shall be governed by Indian Arbitration and Conciliation Act 1996, as amended from time to time.

(ix) Interest on Arbitration Award

Where the Arbitration Award is for payment of money, no interest shall be payable on whole or any part of the money for any period, till the date on which the award is made.

(x) Cost of Arbitration

The Cost of Arbitration shall be borne equally by the respective parties. The cost shall, interalia, include the fees of the arbitrator (s) and other expense as per the rates fixed by the Employer from time to time.
CHENNAI METRO RAIL LIMITED

CHENNAI METRO RAIL PROJECT PHASE II

CONTRACT – PHASE II – DDC/P2C3/ 01
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/ 01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION 7

CONDITIONS OF CONTRACT- (PART-II)
PARTICULAR CONDITIONS & CONTRACT FORMS

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONNAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
# CHENNAI METRO RAIL LIMITED
CHENNAI METRO RAIL PROJECT PHASE II

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<td></td>
<td>- Appendix 3- BG for Mobilization Advance</td>
<td></td>
</tr>
</tbody>
</table>
1. PARTICULAR CONDITIONS & CONTRACT DATA

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Clause</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>GC 1. (i) Project</td>
<td>Chennai Metro Rail Phase II</td>
</tr>
<tr>
<td>2.</td>
<td>GC 1 (ix) Engineer In charge</td>
<td>To be nominated by Employer</td>
</tr>
<tr>
<td>3.</td>
<td>GC 1 (x) Time for completion</td>
<td>(i) 56 days after the issue of final payment certificate to the civil contractor or, (ii) on the date on which all stations/structure/buildings on the section/corridor are put to use for fare paying public, whichever is later.</td>
</tr>
<tr>
<td>4.</td>
<td>GC 1 (xiv) Client’s Country</td>
<td>India</td>
</tr>
<tr>
<td>5.</td>
<td>GC 1 (xv) Effective date</td>
<td>Date of issue of Letter of Acceptance (LoA)</td>
</tr>
<tr>
<td>6.</td>
<td>GC 1 (xviii) Location</td>
<td>Chennai Only</td>
</tr>
<tr>
<td>7.</td>
<td>GC Clause 2.5 Interpretations Priority of documents</td>
<td>The documents forming the Contract are to be taken as mutually explanatory of one another. If there is an ambiguity or discrepancy in the documents, the Employer shall issue any necessary clarification or instruction to the consultant, which shall be binding on the consultant; and the priority of the documents shall be as follows:</td>
</tr>
<tr>
<td></td>
<td>i) The Contract Agreement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ii) The Letter of Acceptance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii) Letter of clarifications, Addenda and corrigendum, if any;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv) Notice inviting Tender</td>
<td></td>
</tr>
<tr>
<td></td>
<td>v) Instruction to Bidders;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vi) Terms of Reference;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vii) The Payment Schedules;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>viii) The General Conditions of Contract;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ix) The Consultant’s Proposal; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>x) Any other document forming part of the Contract.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>GC 4 Reasonable time</td>
<td>45 working days after Consultant made the written request.</td>
</tr>
<tr>
<td>9.</td>
<td>GC 8.3 Issue of Completion certificate</td>
<td>(i) 56 days after the issue of final payment certificate to the civil contractor or, (ii) on the date on which all stations/structure/buildings on the section/corridor are put to use for fare paying public, whichever is later.</td>
</tr>
<tr>
<td>10.</td>
<td>GC 14.3 Performance Standards &amp; GC 37 Consultant’s Warranty of design</td>
<td>CMRL will not entertain any cost implications &amp; time impact claims during design &amp; construction phase under any circumstances arising out of below works which is not defined as &quot;change in scope&quot; in this contract:</td>
</tr>
<tr>
<td></td>
<td>I. Design alteration/modification arising out of system wide interface co-ordination till the preparation and issuance of “Good for construction” drawings during pre-award of construction contracts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Design alteration/modification arising out of interfacing &amp; coordination with system wide contractor, based on approved samples and approved mock-ups for architectural finishes and building works, civil works, MEP and any other works as stipulated in present scope of works as stipulated in this contract or any defective design, gross negligence diagnosed later due to non-compliance with codes and standards leading to the updating and reproduction of designs and drawings post-</td>
<td></td>
</tr>
</tbody>
</table>
award of construction contracts and during construction phase till operation of stations and beyond till defect liability period.

III. Any other requirements necessary and essential for ensuring passenger safety, security and surveillance, requirements of various civic infra authorities, government stakeholders available during design phases like:
   a. Highways
   b. Railways
   c. PWD
   d. AAI
   e. CPCB/ TNPCB
   f. IAF
   g. Fire
   h. CMWSSB
   i. CMDA
   j. Coastal Regulation Zones (CRZs)
   k. EC
   l. GCC
   m. TNEB
   n. Heritage conservation committees.
   o. TNEB

Comments, suggestions or mandatory compliances of the above authorities along with stipulated compliances issued through government circulars, gazetted notifications, office orders, guidelines issued by MoUD, Environment and forest departments, pollution control boards pertaining to public health, safety, amenities should be incorporated in the design and clearly recorded in writing and shared for concurrence to CMRL before the award of construction contracts. Consultant therefore should not hide any such requirement and make good of their designs, if the requirements are discovered by CMRL at later stage without any cost or time implications to CMRL at consultants cost. Any such requirements limited this clause only, issued by government through change in legislation or made mandatory through government circulars, gazetted notifications, office orders, guidelines issued by MoUD, Environment and forest departments, pollution control boards at later stage after the contract awards or during construction phase may be considered as “change in scope” upon written request by the consultant to the CMRL and it will separately.

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<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>GC 18</td>
<td>Limit of liability Two times of contract value</td>
</tr>
<tr>
<td>12.</td>
<td>GC 28.4</td>
<td>Penalty for non-deployment of Key Personnel 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.</td>
</tr>
<tr>
<td>13.</td>
<td>GC 31</td>
<td>Amount of performance Guarantee 7.5% of agreed contract price stated in the Letter of Acceptance suitably adjusted in the event of modification of contact price.</td>
</tr>
<tr>
<td>14.</td>
<td>GC 31</td>
<td>Validity of performance Guarantee The Performance Guarantee shall remain valid up to 28 days beyond issue of performance certificate.</td>
</tr>
<tr>
<td>Guarantee</td>
<td>15. GC 32 Penalty for Change in Personnel</td>
<td>Penalty leviable for change in Key-personnel more than twice during this contract period for each position will be INR 10 Lakh per position.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>16. GC 48 Contract Key dates &amp; Liquidated Damages</td>
<td>Refer Table: Key Dates &amp; Liquidated Damages</td>
</tr>
</tbody>
</table>
2. **TABLE: KEY DATES & LIQUIDATED DAMAGES**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Description of Major items/ Portion of DDC works</th>
<th>Key Dates from the date of commencement of works (* in calendar days)</th>
<th>Liquidated Damages to be recovered in each IPC on non-attainment of Key Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG KD 1</td>
<td>Setting up of design office in Chennai</td>
<td>45 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 2</td>
<td>Presentation/ workshop/ submission for BIM Execution plan</td>
<td>60 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 3</td>
<td>Mobilization of Key personnel and lead design checker/s</td>
<td>75 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 4</td>
<td>Development/ presentation and submission of overall conceptual design with options</td>
<td>90 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 5</td>
<td>Resubmission of conceptual plan addressing the comments of the Employer/ Employer’s Representative</td>
<td>120 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 6</td>
<td>Submission of preliminary civil, structural, architectural, finishes tracks, MEP, TVS, VAC designs, drawings, specifications, reports etc. based on approved conceptual designs. Identification and submission of report pertaining to potential Property development areas within station structures including financial viability report of the proposals.</td>
<td>180 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 7</td>
<td>Development and submission of Definitive/ detailed design and drawings with Lead Design Checker/s (LDC) certificate (civil, structural, architectural, finishes, tracks, MEP, TVS, VAC) of all elements including signage, space proofing, fit outs (tunnels/ viaducts as applicable), allied structures, etc. including fire detection, fire suppression, fire compartmentation etc. Submission of Combined Services Drawings (CSD), General arrangement drawings (GAD) and Structural Electrical Mechanical (SEM) drawings with LDC certificate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UG KD 7 (A)</td>
<td>Civil, Structural, architectural designs with finishes</td>
<td>270 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 7 (B)</td>
<td>MEP</td>
<td>270 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 7 (C)</td>
<td>TVS</td>
<td>330 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 7 (D)</td>
<td>VAC</td>
<td>330 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 7 (E)</td>
<td>Tracks</td>
<td>330 days</td>
<td>INR 1Lakh/Day</td>
</tr>
</tbody>
</table>
Development and submission of construction reference drawings with Lead Design Checker/s (LDC) certificate (civil, structural, architectural, finishes, tracks, MEP, TVS, VAC) of all elements including signage, track supporting structures, fit outs (tunnels/viaducts as applicable), allied structures etc. including fire detection, fire suppression, fire compartmentation etc.
Submission of Combined Services Drawings (CSD) and Structural Electrical Mechanical (SEM) drawings with LDC certificate
Delivery of Tender drawings, BOQ, Cost estimate, specifications and all other necessary documents needed for floating the tenders for each contract package.

<table>
<thead>
<tr>
<th>UG KD 8 (A)</th>
<th>Civil, Structural and architectural designs along with final submission of Multi-modal integration (MMI) schemes &amp; plans, road restoration, site-reinstatement and landscaping plans.</th>
<th>390 days</th>
<th>INR 1Lakh/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG KD 8 (B)</td>
<td>MEP</td>
<td>450 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 8 (C)</td>
<td>TVS</td>
<td>450 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 8 (D)</td>
<td>VAC</td>
<td>450 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 8 (E)</td>
<td>Tracks</td>
<td>540 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 8 (E)</td>
<td>Submission of detailed Architectural finishes</td>
<td>540 days</td>
<td>INR 1Lakh/Day</td>
</tr>
<tr>
<td>UG KD 9</td>
<td>Submit necessary technical documentation and revisions as necessary for approval of commissioner of Metro rail safety</td>
<td>1350 Days</td>
<td>INR 1Lakh/Day</td>
</tr>
</tbody>
</table>
### 3. KEY PERSONNEL LIST FOR P2C3-01- (UG)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Key- Personnel</th>
<th>Nos.</th>
<th>Experience</th>
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<tbody>
<tr>
<td>1.</td>
<td>Project Manager</td>
<td>1</td>
<td>Minimum Design Experience – 20 Years Relevant Design Experience in Metros- 10 Years Minimum Design Experience in the role of project manager- 3 years or Deputy Project manager- 5 years <strong>Educational Qualification</strong>- Postgraduate Structures from a reputed institution.</td>
</tr>
<tr>
<td>2.</td>
<td>Lead Designer/ Underground (stations &amp; Tunnels)</td>
<td>1</td>
<td>Minimum Design Experience – 15 Years Relevant Design Experience in Metros- 5 Years Minimum Experience in the role of Lead designer for underground structures- 3 years or Senior structural engineer in field of underground structures- 5 years <strong>Educational Qualification</strong>- Postgraduate Structures from a reputed institution.</td>
</tr>
<tr>
<td>3.</td>
<td>Lead Designer/ Tracks</td>
<td>1</td>
<td>Minimum Design Experience – 15 Years Relevant Design Experience in Metros/ railways- 8 Years Minimum Experience in the role of Lead designer for tracks- 3 years or Senior structural engineer in field of track design - 5 years <strong>Educational Qualification</strong>- Postgraduate Structures from a reputed institution.</td>
</tr>
<tr>
<td>4.</td>
<td>Lead Designer/ Architect</td>
<td>1</td>
<td>Minimum Design Experience – 15 Years Relevant Design Experience in Metros architecture- 3 years or Senior architect in field of Metros - 5 years <strong>Educational Qualification</strong> - Degree in architecture from a reputed institution.</td>
</tr>
<tr>
<td>5.</td>
<td>Lead Designer/ MEP</td>
<td>1</td>
<td>Minimum Design Experience – 15 Years Relevant Design Experience in Metros/ railways- 5 Years Minimum Experience in the role of Lead designer in the field of MEP works- 3 years or Senior MEP design engineer - 5 years <strong>Educational Qualification</strong> - Degree in Electrical Engineering from a reputed institution.</td>
</tr>
<tr>
<td>6.</td>
<td>Lead Designer/ TVS &amp; VAC systems</td>
<td>1</td>
<td>Minimum Design Experience – 15 Years Relevant Design Experience in Metros/ highway tunnels- 5Years Minimum Experience in the role of Lead designer in the field of TVS/VAC works- 3 years or Senior VAC/TVS design engineer - 5 years <strong>Educational Qualification</strong>- Degree in Mechanical Engineering from a reputed institution.</td>
</tr>
<tr>
<td>8.</td>
<td>Senior quantity surveyor-cum- bid manager</td>
<td></td>
<td>Minimum Experience – 15 Years Relevant Experience in quantity surveying of large/ heavy infrastructure projects - 5 Years Minimum Experience in the role of quantity surveyor - 5 years or bid manager - 7 years Qualification- Degree in civil Engineering from a reputed institution.</td>
</tr>
<tr>
<td>9.</td>
<td>Senior Interface Manager</td>
<td>1</td>
<td>Minimum Experience – 15 Years Relevant Experience in dealing large/ heavy infrastructure projects - 5 Years Qualification- Degree in Civil/ Electrical/ Mechanical Engineering</td>
</tr>
<tr>
<td>10.</td>
<td><strong>Senior BIM Coordinator</strong></td>
<td>1</td>
<td>Minimum Experience – 10 Years Relevant Experience in dealing large/heavy infrastructure projects – 3 Years Qualification - Degree in Civil/Architecture/Electrical/Mechanical Engineering from a reputed institution.</td>
</tr>
</tbody>
</table>

**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.
APPENDIX – 1

FORM OF BANK GUARANTEE FOR PERFORMANCE GUARANTEE

(Reference Clause 31 of GCC)

(To be stamped in accordance with the Stamp Act of the country of Issuing Bank)

To

CHENNAI METRO RAIL PROJECT,

WHEREAS ............(Name of DDC) .................the Consortium / Joint Venture consisting of
1. (Name of Lead Member of the Group and address)
2. (Name of Member of the Group and address)
3. (Name of Member of the Group and address)

(hereinafter called “the Consultant”), with M/s.........................as the lead member has undertaken, in pursuance of “ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, ARCHITECTURAL, MEP & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”AND WHEREAS it has been stipulated by you in the said Contract that the Consultant shall furnish you with a Bank Guarantee by a recognised bank for the sum specified herein as security for compliance with his obligations in accordance with the contract in lieu of cash deposits held by you for such compliance with his obligations in accordance with the contract in lieu of cash deposits held by you for such compliance of obligation/ performance Guarantee.

AND WHEREAS we have agreed to give the Consultant such as Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the consultant up to a total of ..............(amount of Guarantee)..................(in words), such sum being payable in Indian Rupees, and we hereby unconditionally, irrevocably and without demur undertake to immediately pay you, upon first written demand and without cavil or argument any sum or sums within the limits of ............(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.
We hereby waive the necessity of your demanding the said debt from the Consultant before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract or of the Works to be performed there under or of any of the contract documents which may be made between you and the consultant shall in any way release us from any liability under the guarantee and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid up to 24 months after ‘the date of completion as mentioned in the completion certificate’ OR ‘the date on which all the stations/structures/buildings on the section/corridor are put to use for fare paying public whichever is later i.e up to -------------------------- (as per the present construction schedule) and shall be suitably extended if the commissioning of the project is delayed for whatsoever reason. The pendency of any dispute or arbitration or other proceedings shall not affect this Guarantee in any manner.

SIGNATURE AND SEAL OF THE GUARANTOR

NAME OF BANK ---------------------

ADDRESS-----------------------------

DATE-----------------------------

Notes:

1. The stamp papers of appropriate value shall be purchased in the name of the Bank, who issue the Bank Guarantee'.
APPENDIX – 2

FORM OF AGREEMENT

AGREEMENT FOR CONTRACT NO. CONTRACT NO. P2C3-01

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, ARCHITECTURAL, MEP & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

BETWEEN

CHENNAI METRO RAIL LIMITED – CHENNAI 600 107

AND

---------------------------------------------------------------------------------------------

ON ..........DAY OF ....................

Director (Projects), Authorized Representative
Chennai Metro Rail Limited On behalf of
Chennai – 600 107. ...........................................................................................................

CONTRACT AGREEMENT

This CONTRACT AGREEMENT is made at Chennai on this day of ....................... by and between:

Chennai Metro Rail Limited, a Company incorporated under the Companies Act 1956 (No.1 of 1956) and having its principal place of business at Administrative Building, CMRL Depot, Poonamallee High Road, Koyambedu, Chennai – 600107, Tamil Nadu, India hereinafter referred to as the “CMRL” or the “The Employer”, as the case may be, of the one part,

And;

M/s .........................................................................................................................., comprising of :

(1) M/s .................................................................................., a joint stock company with an executive board and a supervisory board, organized under the laws of ...........................................................................................................

and
(2) ........................................... a company registered and existing under the Companies Act 1956 (No.1 of 1956) with registered office located at .................................................................

Hereinafter called as “the DDC” or “the Consultant” on the other part, each of which is jointly and severally liable to the Employer for all the contractor’s obligations under this contract and ........................................... authorised to sign and bind the company, under the Board resolution for .............................................& Power of Attorney for ..........................................................

The term “Employer” and Consultant” or “the DDC" wherever occurs would mean their respective administrators, executors and successors in perpetuity.

WHEREAS the Consultant has established a Consortium in accordance with Indian law and offered a tender for the “ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, ARCHITECTURAL, MEP & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-)383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT" as mentioned in contract documents and agrees to undertake performance of such works (as well as a Guarantee of such works) thereof under the terms and conditions set forth in this contract and remedying of defects therein.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:--

1. In this Agreement words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement and the order of priority of the documents shall be as follows:

   (a) The Contract Agreement, (CA)
   (b) Acceptance letter by ......................
   (c) Letter of Acceptance (LOA), .
   (d) Letter of clarifications (letter nos)
       i. .
       ii. .
   (e) Addendum/Corrigendum,
   (f) Contract Documents including:
       Section 1: NIT & Letter of Invitation
       Section 2: Instruction to bidder
       Section 3: Scope of works.
       Section 4: Evaluation and Qualification Criteria
       Section 5: Technical Bidding Forms
       Section 6: Financial Bid
       Section 7: Conditions of contract & Contract Forms
Section 8: Reference Documents.

All of the foregoing documents, together with this Contract Agreement, are referred to herein as the Contract Documents. Also incorporated into these Contract Documents, and made part hereof, are all codes, standards, specifications and similar requirements that are referred to therein. In the event of a conflict, ambiguity or discrepancy between the contents of the Contract Documents, the order of precedence shall be according to the General Conditions of Contract.

3. In consideration of the payment to be made by the Employer to the Consultant as hereinafter mentioned, the Consultant hereby covenants with the Employer to execute and complete the Works by ......................... from the date of issue of Letter of Acceptance dated ......................... and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Consultant in consideration of the execution and completion of the Works and the remedying of defects therein, the Total Contract Price and value of Services as mentioned herein. This amount is inclusive of all taxes, duties, levies, cess, insurance, etc., except Service Tax being the sum stated in the Letter of Acceptance subject to such additions thereto or deductions there from as may be made under the provisions of the Contract at the times and in the manner prescribed by the Contract.

5. **OBLIGATION OF THE CONSULTANT:**

The Consultant agrees, subject to the terms and conditions of the Contract Documents, to perform efficiently and faithfully all of the works of design and services “ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, ARCHITECTURAL, MEP & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”, and other design consultancy services necessary for or incidental to the successful completion of the Works and in carrying out all duties and obligations imposed by the Contract Documents. The Consultant shall ensure full compliance with tax laws and other laws applicable in India with regard to this Contract and shall be solely responsible for the same. The Consultant shall submit copies of acknowledgements evidencing filing of returns every year and shall keep the Employer fully indemnified against liability of tax, interest, penalty, insurance etc., of the Consultant in respect thereof, which may arise.

6. **OBLIGATION OF THE EMPLOYER:**

The Employer agrees, subject to the terms and conditions of the Contract Documents, to pay the Consultant the amount specified, and at the rates and terms and in the manner set forth in the Contract Documents.
7. **VALUE OF SERVICES AND COMPLETION TIME:**

The Employer agrees to pay for the total cost of the Works and the Consultant agrees to accept the sums mentioned below in Indian Rupees, to be the total cost for the Service carried out by them as part of their obligations, responsibilities and liabilities under and according to the provisions and obligations imposed on him by the Contract. However CMRL reserves the right to terminate the contract at its own convenience without assigning any reasons.

Fixed Lump Sum Price of Rupees ..................................................... subject to adjustment in accordance with the provisions of GCC.

The above Lump Sum price include price escalation, all taxes, royalties, duties, fees, cess, octroi, other levies etc. except Service Tax.

All payments shall be subject to tax deduction at source (TDS) in accordance with the provisions of the Indian Income Tax Act and any other applicable law.

The Consultant shall complete the Works within Forty Eight (48) months (refer Clause 12 of ITT) from the date of commencement.

8. **NOTICES:**

All notices called for by the terms of the Contract Documents shall be in writing in the English language and shall be delivered by hand or by registered mail, acknowledgement due, to the parties' addresses given below. All notices shall be deemed to be duly made when received by the party to whom it is addressed at the following addresses or such other addresses as such party may subsequently notify to the other:

**Employer:**

**Director (Projects)**
Chennai Metro Rail Limited
Administrative Building, CMRL Depot,
Poonnamallee High Road,
Koyambedu, Chennai – 600107.
Tamil Nadu, India

**Consultant:**

............................................
............................................
............................................

9. **INTEGRATION**

The Employer and the Consultant agree that this Contract Agreement, together with the other Contract Documents, expresses all of the agreements, understandings, promises, and covenants of the parties, and that it integrates, combines, and supersedes all prior and contemporaneous negotiations, understandings, and agreements, whether written or oral.
and that no modification or alteration of the Contract Documents shall be valid or binding on either party, unless expressed in writing and executed with the same formality as this Contract Agreement, except as may otherwise be specifically provided in the Contract Documents.

10. GOVERNING LAW

This Contract is enforceable and construed under the laws of the Republic of India.

11. LANGUAGE

This Contract Agreement and the other Contract Documents are made in the English language.

12. FORCE MAJEURE

(a) If, at any time during the currency of the Contract, the performance in whole or in part by either party of any obligation under this Contract shall be prevented or delayed by reason of any war, hostilities, invasion, acts of public or foreign enemies, rebellion, revolution, insurrection, civil commotion, sabotage, large scale arson, floods, earthquake, large scale epidemics, nuclear accidents, any other catastrophic circumstances or acts of God (hereinafter referred to as "event") then, provided notice of the happening of such an event is given by either party to the other within 14 days of the occurrence thereof :

i. Neither party shall by reason of such event be entitled to terminate the Contract or have claim for damages against the other in respect of such non-performance or delay in performance.

ii. The obligations under the Contract shall be resumed as soon as practicable after the event has come to an end or ceased to exist.

iii. If the performance in whole or part of any obligation under the Contract is prevented or delayed by reason of the event beyond a period of 90 days, either party may as its option give request for Reimbursement or Extension of Time under the provisions of the contract.

iv. The cost of rebuilding or replacing for reimbursement shall be done based on assessment of the documents submitted as proof of the same else as per rates, which are determined to be fair and reasonable by the Engineer.

(b) If neither party issues notice regarding the event within 14 days of its occurrence, the said event shall be deemed not to have occurred and the Contract will continue to have effect as such.

13. ADJUDICATION AND ARBITRATION

(a) Adjudication
i. If any dispute between consultant and Employer is not resolved through Amicable Settlement, either party to this contract ("the Referring Party") may at any time give notice ("the Notice") in writing to the other party of its intention to refer a dispute arising under the contract to adjudication.

ii. The sole member of the Dispute Adjudication Board shall be nominated by the Managing Director of CMRL and he shall not be lower than DGM of CMRL and who has not dealt with this contract. The remuneration for the Adjudicator shall be shared by both parties.

iii. The adjudicator shall reach a decision within 60 days of referral or such longer period as is agreed between the parties after the dispute has been referred.

iv. The adjudicator shall act impartially. The adjudicator may take the initiative in ascertaining the facts based on the contractual provisions. For this purpose, the adjudicator may, in addition to documents already submitted as part of particulars, call upon additional documents from either party.

v. The party which is not satisfied with the adjudication award may apply for arbitration within one month, failing which the decision of the adjudicator shall be final.

(b) Arbitration

If the efforts to resolve all or any of the disputes through adjudication fail, then such disputes shall be referred within 30 days to Arbitration in accordance with the following provisions:

i. Matters to be arbitrated upon shall be referred to a sole Arbitrator where the total value of claims does not exceed Rs. 5 millions. Beyond that claim limit of Rs. 5 millions, there shall be three arbitrators.

ii. For those disputes to be decided by sole Arbitrator, the Employer shall send a panel of three serving/retired officers not less than the rank of GM of CMRL, out of which the consultant shall choose one, who will be appointed as sole arbitrator.

iii. For those disputes to be decided by a panel of three Arbitrators, the Employer shall send a panel of five serving/retired officers not less than the rank of GM of CMRL. The consultant and the Employer shall choose one arbitrator each and the two so chosen shall choose the third arbitrator from the said panel, who shall act as the presiding Arbitrator of the Arbitration Panel.

iv. If in a dispute, the consultant fails to select the arbitrator within thirty (30) days after the Employer has furnished the panel, the MD,CMRL may nominate an arbitrator from the panel of arbitrators, for that dispute.
v. The two chosen arbitrators fail to appoint the third arbitrator within 30 days after they have been appointed, the Employer or the consultant may apply to the Managing Director of CMRL, to nominate the third arbitrator from the panel, for the matter in dispute.

vi. The arbitration hearings shall be held in Chennai only. The language of the proceedings, that of documents and communications shall be English and the awards shall be made in writing. The arbitrators shall always give item-wise and reasoned awards in all cases where the total claim exceeds Rs. One million.

vii. On account of adjudication or arbitration proceedings the work shall not be suspended.

viii. Rules Governing the Arbitration Proceedings

The arbitration proceedings shall be governed by Indian Arbitration and Conciliation Act 1996, as amended up to time of agreement.

ix. Interest on Arbitration Award

Where the Arbitration Award is for payment of money, no interest shall be payable on whole or any part of the money for any period, till the date on which the award is made.

x. Cost of Arbitration

The Cost of Arbitration shall be borne equally by the respective parties. The cost shall, inter alia, include the fees of the arbitrator(s) and other expense as per the rates fixed by the Employer from time to time.

14. JURISDICTION OF COURT

The Courts at Chennai shall have the exclusive jurisdiction to try all disputes arising out of this agreement between the parties.

IN WITNESS WHEREOF the parties hereto have caused their respective Common Seals to be hereunto affixed / (or have hereunto set their respective hands and seals) the day and year first above written.
For and on behalf of the Employer

For and on behalf of the Contractor

DIRECTOR PROJECTS

CHENNAI METRO RAIL LIMITED

CHENNAI – 600 107.

SIGNED, SEALED AND DELIVERED

By the said

________________________

________________________

on behalf of the Employer in the presence of:

Witness __________________________
Name ____________________________
Address __________________________

By the said

________________________

________________________

on behalf of the Contractor in the presence of:

Witness __________________________
Name ____________________________
Address __________________________

Notes: (for preparation of but not for inclusion in the engrossment of the Contract Agreement)

1. If the Consultant comprises a partnership, consortium or joint venture, liability will be joint and several, and each member thereof must be identified.
2. In the case that the Consultant comprises a single company, this line should be deleted entirely, as also should be paragraphs (b) and (c) above.
3. In the case that the Consultant comprises a single company, the word "collectively" should be deleted from this line.
4. Enter the appropriate nature of the Consultant; company, partnership, consortium or joint-venture as the case may be.
5. Enter the date of the appropriate resolution.
6. If the Consultant comprises a partnership, consortium or joint venture, each member thereof must execute.
M/s. Chennai Metro Rail Limited,
Administrative Building,
CMRL (Depot),
Poonamallee High Road,
Koyambedu, Chennai-600 107

1. This deed of Guarantee made this ---- day of ----- 2014 between ----------------------
(Name of the Bank and address) (hereinafter called the “Bank”) of the one part, and
Chennai Metro Rail Limited, Administrative Building, CMRL (Depot), Poonamallee High
Road, Koyambedu, Chennai-600 107 (hereinafter called the “The Employer”) of the other
part.

2. Whereas Chennai Metro Rail Limited has awarded the ______________________
(hereinafter called the Contract) to ______________________
having its Head office at _________________________________
(hereinafter called the Contractor).

3. The Employer has agreed to pay the Contractor a Mobilisation Advance of 10% of the
Contract value in two instalments totalling the sum of Rs.___________ (Rupees
______________Only) payable by the Employer in two equal instalments as a Mobilisation
advance payment under the Clause 38.2 of the General Conditions of Contract (Mobilisation
Advance) of which the above mentioned amount is the full amount.

4. Now we the Undersigned __________________________being fully authorized to sign and
to incur obligations for and on behalf of and in the name of-----------------------------
hereby declare that the said Bank will guarantee the Employer the full
amount of -------------------------------as stated above.

5. After the Employer has made a Mobilisation Advance Payment to the Contractor, the Bank
is engaged to pay the Employer, any amount up to and inclusive of the aforementioned full
amount upon written order from the Employer to indemnify the Employer for any liability of
damage resulting from non-recovery from the Contractor of the so paid Mobilisation
Advance Amount by the Employer, the Bank will deliver the money required by the
Employer immediately on demand without delay and demur and without reference to the
Contractor and without the necessity of a previous notice or of judicial or administrative
procedures and without it being necessary to prove to the Bank the liability or damages
resulting from any defects or shortcomings or debts of the Contractor. The Bank shall pay to
the Employer any money so demanded notwithstanding any dispute / disputes raised by the
Contractor in any suit or proceedings pending before any Court, Tribunal or Arbitrator/s
relating thereto and the liability under this guarantee shall be absolute and unequivocal.

6. This Guarantee is valid until------------------.
7. At any time during the period in which this Guarantee is still valid, if the Employer agrees to grant a time extension to the Contractor, it is understood that the Bank will extend this Guarantee under the same conditions for the required time on demand by the Employer and at the cost of the Contractor.

8. The Guarantee hereinbefore contained shall not be affected by any change in the Constitution of the Bank or of the Contractor.

9. The neglect or forbearance of the Employer in enforcement of payment of any moneys, the payment whereof is intended to be hereby secured or the giving of time by the Employer for the payment hereof shall in no way relieve the bank of their liability under this deed.

10. The expression “The Employer”, “The Bank”, and “The Contractor” hereinbefore used shall include their respective successors and assigns.

11. Notwithstanding anything contained herein:

   a) Our liability under this Bank Guarantee shall not exceed Rs. ------------------------ Rupees (- ----------------------------), and

   b) This Bank Guarantee shall be valid up to ------------------------, and

   c) We are liable to pay the Guarantee Amount or part thereof under this Bank Guarantee only & only if you serve upon us a written claim or demand on or before ------------------------ at ------------------------(Name and Address of the Bank).

In Witness whereof I / We of the Bank have signed and sealed this Guarantee on the ----Day of ------------ 2015 being herewith duly authorized.

For and on behalf of the Bank------------------------

Signed, sealed and delivered for and on behalf of the Bank by the above named in the presence of:

Witness: 1                                                                                                 Witness: 2
CONTRACT – PHASE II – DDC/P2C3/01  
(Tender Notice No CMRL/PHASE II/ DDC/P2C3/01/2018)

“ENGAGEMENT OF DETAILED DESIGN CONSULTANT (DDC) FOR THE WORKS AND SERVICES OF THE DETAILED DESIGN AND DRAWINGS FOR THE ALIGNMENT, CIVIL, STRUCTURAL, ARCHITECTURAL, MEP, TVS, VAC & TRACK WORKS COVERING THE ALIGNMENT AND UNDERGROUND STATIONS FROM MADHAVARAM MILK COLONY TO THOUSAND LIGHTS CH:(-383 to CH: 15742, IN CORRIDOR 3 OF PHASE- II OF CHENNAI METRO RAIL PROJECT”

TENDER DOCUMENTS

SECTION 8

PROJECT PARTICULARS

FEBRUARY 2018

CHENNAI METRO RAIL LIMITED
ADMINISTRATIVE BUILDING, CMRL DEPOT,
POONAMALLEE HIGH ROAD,
KOYAMBEDU, CHENNAI – 600107.
INDIA
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