

**Contract NGNEGC: General Consultant (GC) for Elevated Sections of Extension Projects of Aqua Line from Depot Station to Boraki (2.6 km) & Noida Sec-142 to Botanical Garden (12.513 km) including augmentation of existing depot and RSS works .**



**NOIDA METRO RAIL CORPORATION LIMITED**

**CONTRACT NO: NMRC/Projects/NGNEGC/2026/454**

**Contract NGNEGC: General Consultant (GC) for Elevated Sections of Extension Projects of Aqua Line from Depot Station to Boraki (2.6 km) & Noida Sec-142 to Botanical Garden (12.513 km) including augmentation of existing depot and RSS works .**

**VOLUME-3**

**Scope of Works**

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## **SCOPE OF WORK**

### **1 Objective of Consulting Service**

Noida Metro Rail Corporation Ltd. (NMRC) has started the development of Extension of its Existing Operational Aqua Line metro from Noida Sec-142 to Botanical Garden & Depot Station to Boraki which comprises of a total of 15.068 km Elevated Corridors and 10 nos. of Elevated Stations along with augmentation of the existing Depot and 1 nos. RSS. Thus, it is proposed to engage a General consultant (GC) for assistance in procurement, design management, construction management, system integration, interface management, testing and commissioning of the two extension lines of the Aqua Lines. It includes all civil engineering works (Structural, Architectural Finishing and Building Services including Plumbing as well as E&M Works), tracks, System works like signaling, telecommunication, power traction, AFC, Air conditioning & Ventilation, rolling stock, augmentation of depots, augmentation of OCC (operation control stations), BCC (Back up control center) , stations offices, station integration area and viaduct section over the project routes and integration with other modes of transport, etc.

The services shall include but not limited to tender packaging, preparation and finalization of tender documents for civil, system, and property development contracts including preparing the conceptual plans for complete civil engineering and system works, assisting client to finalize contracts for civil, system, O & M, and property development works, evaluation of tenders, proof checking, system integration, assistance in procurement, assistance in construction supervision (including monitoring of statutory obligations), project management services, contract administration and interface management including assistance in formulating/freezing of specifications, guide-lines, testing and commissioning of Metro Rail Projects in relation but not limited to,

1. All civil structures, alignment & complete geometrical rail profile
2. Tracks,
3. Signals,
4. Telecom facilities,
5. Traction arrangements, Power Supply & SCADA
6. Air conditioning & ventilation,
7. Rolling stock,
8. Platform screen doors
9. Depots,
10. Stations,
11. Automatic fare collection,

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12. Operation control center,
13. Operation planning including degraded modes of operation,
14. Offices, residential and commercial complexes.
15. Station integration areas,
16. Bridges,
17. Elevated sections over the project routes
18. Integration with other modes of transport.
19. E&M comprising of lighting, fire fighting system, fire alarm, fire detection and fire suppression system, public health & environment
20. Preparation of report for improvement of DPR to increase non-fare box revenue.
21. Legal Services
22. Assisting NMRC during the discussions with Lending agencies (NCRPB) and preparation of all documents, processing for approval of loans by the Banks for the Project and during the execution phase, preparation and submission of all the reports as mandated and required by the lending agencies.
23. Any other services and infrastructure required for successful completion, operation and maintenance of the extension projects.

The Brief of the Project is mentioned "Project Information" section and brief summary of projects is mentioned below

S.No.	Description of Corridor	Total Elevated Length (km)	Elevated Stations (no.)	Cost of Project (in Cr.)	Stage of Approval
1	Extension of Aqua Line from Noida Sector-142 to Botanical Garden (Noida)	12.513	8		
2	Extension of Aqua Line from Depot Station to Boraki MTH	2.6	2		
	Total	15.113	10		

Extension of Aqua line from Noida Sector 51 to Char Murti Chowk (G.Noida Sector 4) - approx. 8.044 km elevated section with 5 metro stations corridors are in the process of sanction. If it is get sanctioned during the tenure of this contract, NMRC may assess the requirement of additional man month or Key expert, if any. Based on such assessment

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NMRC may modify the man-month under this contract with prior consent of the consultant. Any modification shall be effective through a written amendment to the contract duly signed by both the parties and shall be binding upon them.

However, if NMRC elects not to modify the man-month allocation and engages another consultant for consultancy services related to the additional corridor(s), the Consultant shall not raise any claim for additional charges, compensation, or damages on account of such engagement of other parties by NMRC.

## **2 Scope of Work**

The scope of GC's services will cover consultancy for planning, preliminary tender design, proof checking of detailed designs, procurement, systems integration, contract administration, project management, approval of horizontal and vertical alignment, assistance in construction/ erection supervision, testing and commissioning of the two extension corridors of Aqua Line. All technical, financial and contract management powers will be exercised by NMRC. GC will have the necessary powers to guide and supervise the implementation of the project within the approvals obtained from NMRC. The GC will obtain NMRC's approval to all matters that lie within their scope of services. Any subsequent changes to the Project detail along with time and cost implication will need prior approval of NMRC.. Proof checking of the designs of stations, Viaduct, Architecture, E&M, Roofing works for these two corridors including all the works of finalizing the Alignment Planning, Preparation and processing of tender documents for the augmentation of depot and other works shall be in the scope of GC.

The services of the General Consultant, is further broadly summarized under the following heads:

- i) Review and, if necessary, supplement the details given in DPR for Metro Project as available with NMRC.
- ii) Review and proof checking of designs prepared by the Detailed Design Consultants and or submitted by the contractors of the NMRC who may be engaged on "Design & Build" basis contracts.
- iii) Review of DDC & Contractor's Submittals such as Preliminary and Detailed Design and Drawings, Technical Design & Drawings, Construction/ Installation Drawings etc. prepared by the Contractors.
- iv) Rendering assistance to NMRC in selection of contractors / suppliers / detailed design consultants and other related services to Metro Rail System.
- v) To prepare tender documents for various contract packages and assist in evaluation, negotiation (if necessary) of bids invited by NMRC and award of contracts including preparation of conceptual plans for various civil engineering structures and depot including that of system works. This includes preliminary designs sufficient to prepare the tender documents for depots, workshops, operation control centre etc.
- vi) GC will provide assistance in planning and monitoring during construction including contract administration, safety, quality and environment aspects for the two

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extension lines.

- vii) Testing and Commissioning of the entire system.
- viii) Preparation of various Manuals.
- ix) Preparation of Disaster Management Plan.
- x) Preparation of Security plan.
- xi) Preparation of Safety, Health and Environment Management plan.
- xii) Preparation of Quality Assurance Plans (QAPs).
- xiii) Planning and arranging training to the personnel of NMRC in operation, maintenance and repair of various equipment's, plants and the system as a whole.
- xiv) Framing Property Development proposal as commercial hubs in stations and commercial and transportation hubs at depots, at terminal stations and at other stations both inside and outside the station box area.
- xv) GC will assist NMRC in coordination with Noida Authority, Greater Noida Authority , IGL,GAIL,UPTCL,PVNL, DMIC, Irrigation deptt. , UP state bridge deptt. Fire deptt. RDSO etc
- xvi) GC will assist NMRC in coordination with Delhi metro rail corporation on safety where there are flyovers planned on alignment common with that of NMRC. GC will assist NMRC in correspondence, drawing, estimate technical input etc. while coordinating with Delhi metro rail corporation and other Government/ State Agencies.
- xvii) GC will assist in coordination with various authorities for successful implementation of project.
- xviii) GC will assist NMRC in keeping the Commissioner of Metro Railway Safety (CMRS) Government of India informed about project design/construction and obtaining intermediate approvals as required.
- xix) GC will ensure adherence, to the 'standards' prescribed by NMRC, by contractors with regard to safety of works, safety of adjoining and overlying structures, safety of workmen and safety of public during construction stage.
- xx) GC will coordinate review/monitor the efforts of all contractors, consultants, suppliers and manufacturers for scope of works under GC.
- xxi) GC will provide its assistance in erection of precast structure at various levels.
- xxii) GC will provide proper interface coordination so as to assure timely completion of all works on time and commissioning of the various sections according to the implementation schedule drawn up.
- xxiii) GC will assist NMRC in ensuring the tests, trials and commissioning of the system (including obtaining final sanction from Commissioner for Metro Railway Safety).
- xxiv) GC will provide schemes for integration with other modes of transport including

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related transportation planning and assist NMRC in putting in place a mechanism of 'seamless travel' through various means of public/private transport with common ticketing and complete AFC integration.

- xxv) GC will advise NMRC on various options of property development with respect to optimal utilization and integration of the separable commercial land available with NMRC.
- xxvi) GC will assist site /working front plans, with various contractors, to enable smooth working and ensuring completion of works as targeted/ scheduled.
- xxvii) GC will assist in preparation of road traffic diversion plans in consultation with traffic police authorities to ensure that traffic flow is not hampered during construction.
- xxviii) GC will assist with contractors to prepare workable, proper, 'muck disposable plans' in consultation with relevant authorities, particularly since a large quantity of muck will be generated from excavation of elevated and Elevated portions.
- xxix) In regard to co-ordination of activities to be carried out by the local authorities and other Government departments, the role of GC would be to frame and put up to NMRC, detailed proposals for being discussed and resolved by NMRC, in various co-ordination groups set up by the Government of India/ State Government of Uttar Pradesh. GC will provide to NMRC all technical data, sketches, drawings, and also attend the coordination meetings along with NMRC for obtaining approval of proposals from these coordination groups. GC will also assist NMRC in submission of disbursement claims to NCRPB/JICA/AIIB/ADB/NDB/AFD/KFW/any other funding agency etc.)
- xxx) GC should ensure that social and environmental aspects are in compliance with the requirements of (national/international) financiers and assist NMRC in preparation of reports from time to time in accordance with the guidelines of the (multilateral) funding agency including complying components of social & environmental safeguards.
- xxxi) The General Consultant shall comply with all requirements and conditions stipulated by national and/or international financiers of the Project
- xxxii) Confidentiality – The GC shall keep the Project design, drawings and other data secret and confidential and shall not disclose to any third party, not use in any unauthorized manner any confidential information regarding the present processing technology and the business affairs of the NMRC which the GC may have acquired through the negotiations, discussions, examination of drawings, designs, process layout, use of infrastructures, etc., leading to the conclusions of this agreement. The parties further agree not to use such information for any purpose whatsoever except in the manner expressly provided for in this agreement. The obligations hereunder shall survive any termination or cancellation of this Agreement.
- xxxiii) Titles to documents – Titles to all technical data including, but not limited to specifications, drawings, bills of materials, flow diagrams, layout details and the

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contents thereof, furnished by NMRC to the Contractor shall remain with . The GC shall not use or divulge the data to others except to the extent necessary in connection with the performance by the Contractor.

xxxiv) Patents – The GC shall at all times indemnify NMRC against all claims which may be made in respect of the items for infringement of any right protected by patent, registration of design or trade mark.

xxxv) GC will provide assistance in inspection of material , machine, equipment in India or abroad as needed and issue a requisite report and certificate.

## **2.1 Validation Studies**

On commencement of the services, the GC shall immediately undertake validation of the following studies:

- a) The GC shall review and, wherever necessary, supplement the details of the project DPR and other available reports, including design criteria, specifications, drawings, reports etc., with the object of deciding on the parameters/details to be included in the tender documents.
- b) GC shall review the project costing and update the project costing as per current market rates and submit a detailed report to NMRC. GC shall also recommend measures to reduce the construction cost and time. A detailed study / parametric analysis of similar methods adopted in other metros for such cost and time optimization shall also be submitted.
- c) Review and fine-tuning of the proposed corridor alignment. This shall include the detailed examination of the viaduct horizontal/vertical profiles, station locations, track parameters, etc., and recommendation of modifications, if any, for cost optimization.
- d) Review and validation of the geotechnical investigation report, which shall include the detailed examination of the borehole reports, lab test results, and foundation recommendations.
- e) Review and validation of the Design Basis Reports submitted by DDC / D&B contractor / any agency engaged by NMRC.
- f) GC shall study and analyze the system of train operation of the existing operational network of NMRC and recommend a train operation plan for the proposed 2 extension corridors, which shall take into consideration the integration of the existing and proposed corridors.
- g) GC shall study the existing corridor and advise the employer on the necessity of any modification, upgradation, or additional provisions required to ensure seamless integration and operation of the extension lines and in compliance to the prevalent statutory requirements.

## **2.2 Preliminary Metro system design:**

This will cover the following, but not limited to;

- i) Physical Locations of all stations and detailing of route alignment.

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- ii) Sectional passenger flow diagram.
  - iii) Preliminary train operation diagram.
  - iv) Main size of railcar and train formation.
  - v) Traction Current collection system of railcar.
  - vi) Power supply system.
  - vii) Track structure type.
  - viii) Signaling & Telecommunication system.
  - ix) Train operation system.
  - x) Ticketing system and Ticket checking system.
  - xi) Preliminary cost estimates and financial status monitoring.
- a) **Preliminary design:**
- i) Evaluation & Selection of method of Construction including that of viaduct design options.
  - ii) Outline of rail car performance. Train operation and inspection diagram.
  - iii) Outline and layout of railcar depots, inspection facilities, and workshops.
  - iv) Outline of substations and power supply system.
  - v) Outline of signaling system.
  - vi) Outline of telecommunication system.
  - vii) Outline of total integration of controlling train operation, traffic, passengers' guidance and monitoring, disaster prevention, air-conditioning and ventilation, sales management, power supply, railcar and facility inspection and maintenance, and general administration.
  - viii) Outline of buildings for head and branch offices, and control centers.
  - ix) Outline of inspection and maintenance of equipment & depot.
  - x) Outline of physical stock and distribution base.
  - xi) Phased construction schedule.
  - xii) Construction cost, annual budget estimation and cash flow.
  - xiii) Detailing and designing of Connection of the proposed metro corridors with the existing operational lines including suggestion of any change from the DPR.
- b) **Optimization of Operations and Maintenance Practices:**
- This will cover, but not limited to the following:
- i) Optimization of power supply capacity during peak and off peak hours.
  - ii) Comparison between manual maintenance and investment for man-saving maintenance equipment's.
  - iii) Conflict among centralized control, independent control and central monitoring and decentralized autonomous control.

### **2.3 Preparation of tender document**

GC will prepare the tender document, keeping in view the following:

- a) Tender can be either "Design and construct "or "Construct Only" for NMRC Project, including viaduct, stations, residential quarters, Operations Control Centre (OCC) and

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Administrative building etc. This contract will also include augmentation of depot, systems, RSS etc. including general electrical and mechanical works at the stations. Tenders of all Metro Line works for this Project are in the scope of this contract.

- b) GC shall proof check all the designs for adoption as Tender designs covering all aspects relevant to the implementation of Elevated portions, stations, viaduct and in the degree of detail as required in tender documents for such projects. Tender Design will include but not limited to:
- i) Geometric designs of final alignment plans and its profile to appropriate scale.
  - ii) Design for soil stabilization/improvement and required disaster prevention system.
  - iii) Architectural and Engineering design (Foundation, Substructure and Superstructure) for Elevated stations including related details of stair cases, pedestrian accesses, elevators, escalators, air-conditioning equipment, platform screen doors (if provided), evacuation facilities, etc. Consultant would also suggest alternative to conventional air conditioning to achieve climate control i.e. reduction in dust & temperature.
  - iv) Foundation, Substructure and Superstructure design of viaduct including Special Spans (not covered in DDC Contract).
  - v) Right of way plans on topographical and cadastral maps provided by NMRC.
  - vi) Any other relevant details/data.
- c) **Finalization of outline design criteria, specifications, standards and codes of practice to be followed.**
- i) The recommended design criteria, specifications, standards and codes of practice will be in accordance with the relevant Indian codes of practice/specifications. Where the standards and specifications, are not available in the Indian Codes of practice/specifications, international codes of practice/specifications will be adopted with the approval of NMRC. The recommended criteria, specifications, etc. will become part of tender design, on acceptance by NMRC.
  - ii) The recommended specifications, and design criteria will also cover the methods of construction, design of temporary works, disposal of excavated materials, as also the external environment under which the work would be required to be executed. The specifications will also prescribe the tests and acceptance standards for various components of works.
  - iii) It is to be ensured that the designs and specifications will meet the project requirement at reasonable cost, without imposing any limitations in regard to competitive bidding. NMRC intends to go completely green and would be harnessing solar energy at stations, depots and viaducts. Design approach should take into account of this. Overall approval of designs prepared/approved by GC will be done by NMRC.
- d) **Preparation of tender packages and tender documents (including systems).**
- i) Based on the tender designs, and accepted design criteria, specifications, standards and codes of practice, the general consultant shall provide assistance in preparation

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of suitable BOQ (wherever required) and estimated cost for the various tender packages.

**ii) The tender and contract documents for the agreed tender packages will include:**

- Notice Inviting Tenders (NIT)
- Form of Tender (FOT)
- Instructions to Bidders (ITT)
- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Technical Specifications (TS)
- Bill of Quantities (BOQ) (wherever required).
- Tender Drawings.
- Form of Contract.
- Pre-qualification documents (PQD)
- Pre-qualification criteria (PQC)
- Tender evaluation criteria.

**iii)** The bids would be invited by NMRC on the basis of the tender documents prepared by the NMRC in assistance with GC.

**iv) Review of Detailed Designs submitted by Contractors/DDC.**

The General Consultant shall review and check the design, including drawings and other related documents submitted by the contractor for conformity with the Specifications and the NMRC requirements and good engineering practices. Particular emphasis shall be given to the system planning and design in aspects of impact on the environment and urban activities, as well as effects on the scheduling of works.

**e) The tentative role of the Detailed Design consultants (DDC), GC & NMRC shall be as follows:**

- i) The designs and drawings will be developed by DDC, on the criteria, specifications, and format, as laid down by GC and approved by NMRC.
- ii) GC will proof check the designs and drawings of all system contracts, for their fitness for adoption in the project.
- iii) While checking the designs, GC will ensure that designs and drawings, are functionally complementary for the multi-disciplinary works and the construction activity on such works, is not hampered or delayed for want of timely availability of the designs and drawings.
- iv) The responsibility for preparation of Bill of Quantities (BOQ) on basis of the approved drawings will be that of DDC, but the BOQs will be checked by GC. Wherever, the BoQ preparation is not in the scope of DDC or there is no DDC, GC will prepare the BOQ and tender document wherever it is required.
- v) The bids for construction will be invited, taking into account the sequence and time schedule decided in consultation with NMRC.

**2.4 Preparation of Tender design and Tender documents complete for procurement, installation and commissioning of Systems including Rolling Stock, Track, RSS, Traction, S&T, AFC, augmentation of OCC (operation control stations), BCC (Back up control center), PSD, Solar Panels, noise barriers, Lift & Escalator augmentation of Depots etc. for NMRC Projects.**

- a) GC will review and supplement the design criteria/specifications given for various Systems Rolling Stock and Depots.
- b) The tender design for Rolling stock to be used in NMRC will be prepared by GC, in a manner that it is consistent with the final design of corridors, track, stations, and the associated equipment, maintaining safety clearances and ventilation/air conditioning requirements.
- c) The tender design for the rolling stock should be fully compatible with Signaling and Train Control System, traction power system, desired operational system, transport capacity. The recommended designs should satisfy the criteria of economy in initial cost, operating as well as maintenance cost as also life cycle cost.
- d) Tender design for signaling and train control system should be fully compatible with rolling stock , telecommunication, desired operational system, transport capacity etc.
- e) The tender design is required to spell out the basic system design covering the propulsion, brake and auxiliary power supply system in addition to the main structure and safety aspects, in sufficient detail, so as to enable the bidders to make competitive bids.
- f) The tender documents for the Systems, Rolling Stock and augmentation of Depots shall be prepared, giving basic design and safety aspects in sufficient details to enable the bidder to make competitive bids. On the same lines as in para e) above, with suitable modifications. The tender documents will provide for the appraisal standard for evaluation of technical proposals.
- g) Invitation of bids for supply of the required Systems, Rolling Stock and augmentation Depot, equipment's, plant and machinery will be done by NMRC, based on the tender design, specifications and acceptance criteria as approved by the NMRC on recommendations of the GC.
- h) GC will assist NMRC in number of tender packages to call for bids.
- i) There will be separate tender for each item, broadly, as under.
  - i) Detailed design manufacture, supply, installation, testing and commissioning of Traction and Power Supply system.
  - ii) Design, manufacture, installation, testing and commissioning of Rolling Stock and Signalling system as combined work.
  - iii) Design, manufacture, installation, testing and commissioning of Telecommunication system
  - iv) Design, manufacture, installation, testing and commissioning of Lifts.
  - v) Design, manufacture, installation, testing and commissioning of Escalators.
  - vi) Design, manufacture, installation, testing and commissioning of Automatic Fare

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Collection system.

- vii) Procurement of 60kg head-hardened UIC rails.
- viii) Procurement of turn-outs, scissors cross overs, derailing switches etc. for ballastless and ballasted tracks.
- ix) Installation of Track works including supply of fastening system for ballastless tracks for elevated and elevated sections and ballasted/ ballastless tracks for the Depot.
- x) Detailed Design and augmentation of Depot layout and buildings for the existing Depot-cum- Workshop including plant machinery and equipment to be finalized in consultation with NMRC
- xi) Supply and installation of Depot equipment, (the number of contracts to be decided by GC with the approval of NMRC).
- xii) Detailed design manufacture, supply, installation, testing and commissioning of Solar Power systems.
- xiii) Detailed design manufacture, supply, installation, testing and commissioning of noise barrier if required
- xiv) Detailed design manufacture, supply, installation, testing and commissioning of Platform screen Doors (PSD) if required

## **2.5 Selection of contractors/suppliers**

The GC shall assist NMRC in the process of selection of contractors and suppliers. The scope of services to be rendered by the GC in this regard shall include, but not necessarily be limited to:

### **a) Pre-qualification of contractors for bidding**

GC shall undertake all necessary works regarding preparation for invitation, receiving and evaluation of contractor's documents and recommending to NMRC the pre-qualified list for their acceptance wherever prequalification is considered necessary with prior approval of NMRC.

### **b) Evaluation of the tender proposals and recommendations for the selection of the contractors for all contracts**

- i) Prepare the formal evaluation criteria and procedures for evaluation, obtain approval for the same from NMRC and assist NMRC to invite tenders (open or from prequalified tenderers.
- ii) Perform independent evaluation of all tender proposals for all contracts received including ranking of the bidders.
- iii) Prepare a confidential Executive Evaluation Summary Report. This report should contain a concise set of basis and justification for:
  - Ranking of the tenders including the recommendations concerning whether negotiations should be initiated with any of the bidders.

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- Prepare Tender Evaluation Report and presentation documents.
- To make a presentation pertaining to the recommendations to a committee and/or a working group that may be set up by NMRC.

**c) Negotiations with Bidders**

- i) Prepare information and data to be used in the negotiations/clarifications.
  - ii) Assist NMRC in negotiations/clarifications with the selected bidder(s) and record minutes of all meetings.
  - iii) Assist NMRC in analysis and evaluation of the results of negotiations/clarifications in all aspects in order to be able to select the most suitable bidder.
- d) GC will assist NMRC in preparation of Contract agreements as per funding agency's procurement documents. GC will have to assist NMRC in close interaction with funding agency officials in obtaining their approvals for various documents / tenders etc. in terms of provisions in the loan agreement. This will also include submission of periodic status reports/data/ analysis in prescribed formats.

**2.6 Design Proof Checking of DDC and Contractor design**

GC will scrutinize the designs, drawings, engineering and technical proposals submitted by the detailed design consultants and contractors and ensure the adherence to the relevant standard codes of practice etc. GC may suggest corrections / changes if required to achieve the desired standards of work. GC will be solely responsible for conformity or adherence.

Under the design proof checking services, primary focus of the GC shall be the establishment, integration, and assurance of design principles and standards to drive quality, ensure the correctness, adequacy and integrity of the designs and ensure site construction conformity with respect to design development.

The GC shall establish a Quality Assurance Plan (QAP) and a system of internal audit and approval of all designs, including calculations, drawings and other documents. The DDC shall submit the Quality Assurance Plan to the Employer for approval. The QAP shall identify the personnel, procedures, instructions, records and forms necessary to implement the design services as per the QAP.

The scope of services of the GC pertaining to proof checking of civil structural designs shall broadly include the following:

- a) Review and approval of structural designs of all station components including main station box, entry/exit structures, ancillary structures and associated PD area structures.
- b) Review and approval of structural designs of miscellaneous works such as earth retaining structures, underground sumps, underground/overhead tanks, FOBs, Underpass, Ramps, multi-modal integration structures, etc. constructed as part of the project execution.
- c) Review and approval of temporary designs and drawings. Review and approval of

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shop drawings / fabrication drawings including connection details.

- d) Review and approval of the construction methodology and any launching/erection scheme.
- e) Review and approval all the designs and drawings modifications, variations etc. that may arise due to site constraints or Employer's requirements, during the Construction Phase.
- f) Review and approval of any rectification and repair methodology pertaining to structural works upon request from Employer, including submission of necessary additional designs, drawings and necessary technical documentation.
- g) Review and approval of the Rail Structure Interaction (RSI) analysis carried out for the viaduct by NMRC / any agency engaged.

## **2.7 General Design Related Scope**

- a) GC shall review the conceptual designs of the stations submitted by the DDC and suggest modifications/ improvements.
- b) The approval for the conceptual drawings shall be given in consultation with NMRC. GC shall review and approve the site development plans, which shall include elements like compound wall, roads, footpath, pavements, storm water drains, rainwater harvesting pits, pavements, street-scraping, signage, public furniture & fixtures, etc.
- c) GC shall foresee any constructability issues which may delay the project and give value engineering solutions to reduce the time of construction.
- d) GC shall review and approve the designs and drawings (civil - structural & architectural) of all allied station development works such as Non Motorized Transport (NMT), parking facilities, station access/underside road development, underpass/foot over bridges, street-scraping, water front developments, multi-modal integration facilities, last mile connectivity etc., which shall be prepared by the D&B contractor, Design Consultant or any other project stakeholder as appointed by NMRC.
- e) GC shall review and ensure the constructability of all the designs; and also put forward value engineering ideas in order to accomplish quality, time or cost savings.
- f) Scrutiny check, review and certification of all designs and drawings of all civil structures, architectural & PHE components, track structure and enabling works submitted by the contractors, in respect of their adequacy to conform to the design standards.
- g) GC shall ensure design coordination between all stakeholders involved in the project. The GC shall coordinate and interface with the Client, D&B contractor, Design Consultant and/or any other contractor/consultant (from Civil - Structural & Architectural, Track, Systems, etc.) working on the project, and ensure that the interfacing requirements pertaining to detailed structural designs are attended/complied timely.
- h) GC shall monitor the design schedule and manage any changes or delays. The GC shall keep track of all design works carried out by the D&B contractor, Design Consultant or any other contractor/consultant, and ensure that the design deliverables and necessary approvals are available as per the approved project schedule.

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- i) Keeping track of all design variations, including assessment of any technical and financial implications due to the same.
- j) GC should ensure that the approval process of detailed design shall be cleared within 21 days of submission of the detailed design drawings / documents by the D&B contractor and/or design consultant; and the GFCs shall be issued with the countersign of employer within a week of approval of detailed design. Any variation of submission of deliverables from Design consultant/D&B contractor by 7 days from the approved schedule should be immediately brought to the notice of NMRC.
- k) It will be the primary responsibility of the GC to successfully coordinate with D&B contractor, Design Consultant, Employer and/or any other project stakeholder as appointed by NMRC, so as to obtain the approval of all designs & drawings within the stipulated time. The GC shall ensure a smooth approval process to stick to the original project schedule.
- l) Review and approval of as-built drawings and documents pertaining to viaduct (Civil-Structural) and stations including Entry/Exit structure (Civil - Structural & Architectural), prepared by the works contractors.
- m) Prepare and submit an inspection & maintenance manual for the periodic inspection and maintenance of all civil works (mainly structural and architectural works pertaining to viaduct, stations and ancillary structures).

## **2.8 Supervision and Monitoring**

The GC shall be responsible for providing their assistance in supervising all project activities as in volume 3 "scope of work". Suitable methods and systems shall be developed by GC for ensuring implementation to the desired quality and safety, compliance to schedule and compliance with environmental norms. They shall also design suitable information systems to report to NMRC, with latter's approval. The items will include but not be limited to the following:

### **a) Civil work**

During construction of viaducts, stations, and augmentation of depot, RSS, the GC shall perform their duties during the contract implementation period of the contracts to be executed by the NMRC and the Contractor. In this context, the GC shall:

- i) Assist the NMRC concerning variations and claims which are to be ordered/issued at the initiative of the Employer. Advise the Employer on resolution of any dispute with the Contractor.
- ii) Review of the Contractor's method of work, including site organization, program of performance, quality assurance system, safety plan, method statements of safety and environmental monitoring plan so that the requirements set forth in the applicable laws and regulations, the specifications or other parts of the contract are to be duly respected.
- iii) Regularly monitor physical and financial progress, and advise appropriate action to expedite progress if necessary, so that the time for completion set forth in the contract

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will be duly respected by the Contractor.

- iv) Review the Contractor's working drawings, shop drawings, and validate drawings of temporary works.
- v) Organize, as necessary, management meetings with the Contractor to review the arrangements for future work. Prepare and deliver minutes of such meetings to the Employer and the Contractor.
- vi) GC will assist NMRC in Supervision of the works so that all the contractual requirements are met by the Contractor, including those in relation to i) quality of the works, ii) safety and iii) Protection of the environment. Confirm that the accident prevention/Safety officers proposed by the Contractor is duly assigned at the project site. Ensure compliance through the Contractor to take appropriate remedies if any questions are raised regarding the safety measures.
- vii) Monitor quality assurance by conducting the field tests, sampling and laboratory tests carried out by the Contractor and submission of reports to NMRC.
- viii) Coordinate the work among different contractors employed for the Project.
- ix) Inspect, and fairly advise on claims issued by the parties to the contract (i.e. the Employer and Contractor) in accordance with the civil works contract.
- x) Conducting Monthly Safety walks at construction sites and submitting report to NMRC.
- xi) Conducting Quarterly Safety, Health and Environment audits of the Contractors and submitting report to NMRC.
- xii) Monthly Environmental Monitoring of the construction sites and submitting the report to NMRC
- xiii) Conducting Quarterly Quality Audits of the Contractors in accordance with ISO 9001:2015 and submitting the report to NMRC.
- xiv) Supervise commissioning and carry out tests during the commissioning, if applicable.
- xv) Provide technical advice in sophisticated fields like construction method, equipment and technology.

**b) Systems contracts**

The GC shall perform his duties during the contract implementation period of the contracts to be executed by NMRC and the Contractor

- a) Review the Contractor's method of work, including site organization, program of performance, quality assurance system, safety plan, method statements of safety, and environmental monitoring plan so that the requirements set forth in the applicable laws and regulations, the specifications, or other parts of the contract are to be duly respected.
- b) Regularly monitor physical and financial progress, and advise appropriate action to expedite progress if necessary, so that the time for completion outlined in the contract will be duly respected by the Contractor.

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- c) Advise on ambiguities and/or discrepancies in the Contract Documents and prepare necessary clarifications.
  - d) Organize, as necessary, management meetings with the Contractor to review the arrangements for future work. Prepare and deliver minutes of such meetings to NMRC and the Contractor.
  - e) Monitor i) quality of the works, ii) safety and iii) protection of the environment. Confirm that the accident prevention/Safety officers proposed by the Contractor is duly assigned at the project site. Require the Contractor to take appropriate remedies if any questions are raised regarding the safety measures.
  - f) Monitor quality assurance by conducting the field tests, sampling and laboratory tests carried out by the Contractor and submission of reports to NMRC.
  - g) Assist NMRC in review of the construction method, equipment to be used, workmanship at the site, and attend shop inspection and manufacturing tests in accordance with the Employer's Requirements.
  - h) Coordinate the works among different contractors employed for the Project.
  - i) Carry out timely reporting to the Employer for any inconsistency in executing the works and suggesting appropriate corrective measures be applied.
  - j) Jointly supervise Pre-commissioning carried out by the Contractor, check and confirm the Contractor's Pre-commissioning report.
  - k) Jointly supervise Commissioning and Guarantee Test carried out by the Contractor, check and advise NMRC to approve the Contractor's report on the Commissioning and Guarantee Test, and issue the Operational Acceptance Certificate as specified in the Contract
  - l) Check and counter sign the operation and maintenance manual prepared by the Contractor
  - m) Provide technical advice in sophisticated fields like execution method, equipment and technology.
- c) **Site Visits**
- i) To undertake visits to the construction sites, monitor the contractor's activities for ensuring quality, safety and conformity to contract specifications and time frame. It should be noted that though the responsibility for correctness, completeness and adequacy of the works constructed by the contractors and for compliance with statutory obligations remains with the contractors, GC will be responsible for any deficiency in the performance of the contractors.
  - ii) To monitor Contractor's activities with goal of minimizing adverse effects on public safety, traffic, residential and commercial activity, and the environment.
  - iii) GC shall keep NMRC informed of their findings and recommendations resulting from these site visits. The responsibility and urgency of taking corrective measures lies with GC.

## **2.9 Quality Assurance / Quality Control**

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- a) GC shall check/witness FAT ,PAT. SAT ,SIT,and ITC for all system contracts. Outstations expenses (Travel, stay etc.) if any, will be paid as per NMRC policy.
- b) GC will set a quality monitoring system of all contract packages (Civil, E&M, and system contracts).
- c) Establish & implement a system of quality assurance/ control to ensure that construction works are carried out in accordance with the specification and quality assurance/ control procedures.
- d) GC shall regularly monitor the construction activities and material on site and immediately highlight quality non- conformance (NC) to contractor on site, with a copy to NMRC. Corrective action plan to mitigate such identified quality NC prepared by the contractor shall be evaluated and approved by GC timely, to ensure rectification process does not hamper other works and progress of project. GC shall prepare a consolidated report of Quality NC and submit it to NMRC for review on a weekly basis.
- e) Monitor the quality of the work as per specification, relevant codes, and as per sound engineering practices.
- f) Maintain the registers for mandatory tests to be conducted for all materials as per NMRC schedule of dimensions (SOD) /CPWD specifications before incorporation in work. The guidelines may be taken from the Engineer regarding the registers to be maintained.
- g) Advise on the need for independent testing services.
- h) Inspect and approve the materials at site as per specifications before they are used in work.
- i) Shall be responsible for obtaining good workmanship at all stages of work with reference to working drawings and shall ensure correct dimensions of all elements.
- j) In addition to the periodical reports, the GC shall immediately inform the client regarding any serious irregularity or serious lapse on the part of contractor requiring immediate attention, so that remedial measures can be taken.
- k) GC shall prepare a detailed meeting calendar specifying the objectives of each meeting and frequency of meeting in due consultation with NMRC.
- l) As a broad guideline, the following frequency may be adhered to:
  - Design Coordination Meeting –Weekly
  - Site Progress Meeting- Weekly
  - Cost Review Meetings –Monthly
  - Project Progress Meeting – Monthly
  - Executive Meetings – As called for by NMRC
  - Presentations (once every two months) covering how they have contributed to the project by improving efficiency, reducing time of completion or resources etc.
  - Design Review Meeting – As called for by NMRC

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- m)GC shall be required to make presentations to NMRC senior management once every two months covering the project construction status of the project and how they have contributed to NMRC in the execution of the said project by reducing project completion time, enhancing quality, increasing safety on site, reduced efforts by better coordination and other value adds. Management Presentations may include value additions delivered from following perspectives:
- Schedule performance (actual vs. schedule, forecasted delays etc.)
  - Quality Management
  - Safety Management
  - Risk assessment
  - Submission of deliverables
- n)GC shall assist in daily inspection of work site daily and provide guidance to contractors to rectify defects if any. GC shall provide activity related comments for rectification/improvements on the same day or next day office visit. Such activity reports of details and remedial measures given and done shall be given to NMRC weekly. On subsequent visits, compliance relating to the rectifications suggested during the previous visits shall be reviewed, noted and documented and submitted to NMRC.
- o)Shall attend periodic site meetings/meetings in NMRC office and discuss site conditions, likely hindrances, time over-runs, cost overruns and any other important matter along with solutions proposed. GC will be required to submit periodic reports concerning quality standard.
- p) In addition to the periodical reports, the GC shall immediately inform the client regarding any serious irregularity or serious lapse on the part of contractor requiring immediate attention, so that remedial measures can be taken.
- q)The GC shall arrange for a preliminary completion report, rectification report, and final job completion report.
- r) The GC shall help NMRC in settling the bills from the contractors.
- s)The GC shall check periodically the quantities recorded for various items and keep watch on excess/shortage. GC shall account for all variations in tender quantities with respect to execution drawings and submit a report.
- t) The GC shall ensure that work proceeds smoothly and is not hampered for want of decisions/drawings/clarifications.
- u)The GC shall suggest modifications, if any, due to site conditions and advice reasoned justification of cost variations on account of resultant extra items and excess supported by proper analysis.

## **2.10 Health and Safety**

The GC will:

- a) Develop a Program-wide strategic health and safety plan, as well as requirements for project-specific plans, to enable the standardization of health and safety practices and

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results across the Program.

- b) GC will set a safety monitoring system of all contract packages (Civil, E&M, and system contracts).
- c) Develop plans for the communication of requirements and assessment of performance against these.
- d) Develop and deliver basic and specified health and safety training across the Program
- e) Implement a Program to monitor and evaluate health and safety practices and performance, set a schedule for review and improvement of practices, and work with the Client to determine an appropriate schedule to report on Program-wide performance.
- f) Health and Safety, Safety Audit to:
  - Ensure Health Safety and Environmental (HSE) compliance in execution contract. GC shall review and validate contractor's HSE programme and the third party authorized agencies engaged by the contractor for this purpose.
  - GC shall ensure the safety audit is done by the executing agency **through a** licensed firm once in 12 months during the execution of the project.
  - GC shall ensure the highest standards of safety, security and health for all workers of Contractor and also all other persons entering the site in conformance with legal provisions, codes, standards and good practices. GC shall periodically conduct training/orientation and briefing of all workers and visitors in this regard.
  - GC shall ensure that all labour laws are strictly abided during the complete period of all contracts and interest of labour working at site are taken care of.
  - GC shall be responsible for suggesting suitable measures to ensure proper sanitation, hutments, drinking water, safety shoes & helmets, safety belts, and other health related facilities as per requirement of law.

**2.11 Facilitation of implementation of Environmental Management Plan (EMP), Environmental Monitoring Plan (EMoP) .**

The GC shall:

- a) Review and update EIA including EMP and EMoP as appropriate; incorporate necessary technical specifications following design and contract documentation.
- b) Assist NMRC in preparation of EMP and EMoP in accordance with EIA and the conditions stated in environmental permit certifications (EPC) for the Project if any:
- c) Assist NMRC in dissemination and explanation of additionally confirmed and identified environmental issues to public including holding public consultations.
- d) Assist NMRC in obtaining necessary environmental-related permits such as the Consent to Establish and Operate from Central Pollution Control Board in accordance with the planned implementation schedule.
- e) During the preparation of bidding documents, clearly include environmental

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responsibilities as explained in the EIA Report and EMP as “Environmental Contract Specifications (ECS)”.

- f) Ensure that designs and construction methods provide for, as per the EMP, environment-friendly building materials, reuse, resource saving and climate adaptation elements like natural ventilation, solar power installations and rain-water harvesting; piling methods and track design which minimize noise and vibration.
- g) Review the Environmental Program (CEP) to be prepared by the contractor in accordance with EIA, EMP, ECC (Environmental Compliance Certificate) and ECS, relevant plans, conditions set out in relevant permits and clearances and Funding Agencies’ Environmental Policy and to make recommendations to NMRC regarding any necessary amendments for its approval.
- h) Assist NMRC to implement the measures identified in the EMP.
- i) Monitor the effectiveness of EMP and negative impacts on environment caused by the construction works and provide technical advice, including a feasible solution proposal, so that NMRC can improve situation when necessary.
- j) Assist NMRC in monitoring the compliance with conditions stated in the EPC and the requirements under EMP Guidelines. Submit the Environmental Monitoring Report to NMRC at every two months after the commencement of the services until the completion of the Project.
- k) Assist NMRC in the capacity building of NMRC staff on environmental management through on-the-job training on environmental assessment techniques, mitigation measure planning, supervision and monitoring, and reporting.

## **2.12 Contract Administration**

- a) GC shall monitor the progress of contractors and vendors work, contracts, measure performance against the Project Schedule and Project Budget, manage change orders, provide advice on site organizational and execution problems, advice on claims management and provide regular reports to the NMRC.
- b) GC shall evaluate proposed changes to the project scope and configuration in terms of impact on design, scheduling, operations and the budget. The consultant shall review the appropriateness and adequacy of change orders submitted by the contractor(s) prior to submission to NMRC for approval.
- c) GC will assist Client’s to supervise all the works, check and verify all measurements and verify all bills in accordance with design intent, quality, drawings, specifications etc.
- d) GC shall assist NMRC in reviewing and approving the contractor invoice
- e) GC shall provide value engineering and cost optimization for all works contracts.

## **2.13 Interface Management**

GC will:

- i) Coordinate with the Client regarding interface issues

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- ii) Manage external interfaces with major stakeholders
- iii) While the Client will maintain overall responsibility for stakeholder management, the GC will focus on ensuring that stakeholder coordination is done through each of the project components. This will enable the Client to focus on incorporating stakeholders' input, serving as alia is onto all levels of Government.
- iv) The GC will coordinate with the regulatory agencies and other stakeholders that have an interest or are participants in the Project management program for the provision of any required permits.
- v) Interface with operation team and concerned departments/OEM to provide smooth migration without affecting revenue in the phase 1.
- vi) GC shall nominate - Engineer's Possession In Charge (EPIC) for testing and commissioning and interface with O&M in phase 1 with respect to getting job card, permit to work etc.
- vii) GC shall do the material inspection of system contractor.
- viii) GC shall interface with all stakeholders for proper allocation of storage space.
- ix) Any other interface activity for smooth execution of the project

#### **2.14 Project Planning**

- a) GC shall review the Master Schedule submitted by the contractor for the Project and appraise NMRC on the main phases of the Project, major milestones and key inter- relationships, including without limitation of the activities of NMRC, as well as permits from statutory approval.
- b) The consultant shall integrate all program components / sub projects prepared by the contractors. The consultant shall monitor and oversee that separate construction programs are prepared and are compatible with the approved project Master Program. These programs shall be updated by the contractors as applicable. Updates for these component programs are to be prepared at regular intervals or when necessary, by the individual stakeholders to reflect the current status of the relevant activities.
- c) The Master Schedule shall be issued by the consultant in final form to NMRC for review and approval within 15 days from the effective date of the contract/ issue of letter of intent. The schedule would be modified / updated based on contractor's schedule submitted with the proposal.
- d) GC shall develop/review the Master Schedule in Primavera P6 or any other software as approved by NMRC for any contracts by NMRC.
- e) The Master Schedule prepared shall identify critical path activities and establish sign off dates for key activities.
- f) GC shall update the Master Schedule minimum once a month or as deemed fit by NMRC and continuously, monitor and review the schedule during the project duration.
- g) GC shall promptly inform NMRC in writing of any events or situation that is likely to affect the schedule of the projects or any other issues including quality non-compliance, safety compliance etc. along with advice and recommendations for

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corrective action.

- h) In event of delay experienced in completion of the interim/ final project milestones, the contractor(s) shall be required to submit a catch up plan. GC shall review the plans submitted and evaluate the time impact, cost impact, impact to other work areas and any other risk than might arise due to modification from the baseline plan. Compile the evaluation of impacts and submit it to NMRC for review and approval.
- i) GC shall be responsible for establishing procedures and guidelines for regular project progress reporting to NMRC by all parties with respect to the status of cost, schedule, information and decisions.
- j) GC appraise NMRC of the progress (both Physical and financial) and/or activities of the project on a timely basis as deemed fit by NMRC by preparing and submitting monitoring reports. The report shall include the following, but not limited to
- Scope of works of contractors(s)
  - Progress (Both physical and financial) – scheduled vs actual, variations in schedule / cost of project and suggest recovery plans.
  - In the case of Civil Design and Build Contractor Status Reports of Design Submissions. iv. Major issues and decisions pending
  - Status of progress of work
  - Areas of Concern
  - List of Registers maintained by consultant
  - Manpower deployment chart
  - List of equipment mobilized at site
  - Materials/personnel at site including order levels of critical items at site
  - Quality of material / tests registers
  - Photographs of the site
  - Change orders and other claims raised by the contractor
  - Status of statutory inspections and checks & report non-compliance
  - Financial Expert shall, advice NMRC on matters affecting the project budget, provide timely updates that reflect funds received, funds obligated through contract awards and approved change orders, and projected obligations deliverables to ensure contract compliance and performance.
  - Contract and Procurement expert shall prepare tender documents (if required) as per the requirements of the employer. They shall also prepare the reply to the queries, corrigenda and addenda during the tender process and shall evaluate the bids received, prepare reports and assist the employer in all the tendering and procurement related matter still the smooth execution of the agreement.

## **2.15 Information Programmes**

- a) To develop public information programmes in close cooperation with NMRC and inform the general public on: The project in general, The design of stations and other passenger facilities, incl. traffic integration facilities, etc., Temporary restrictions to traffic and other encroachments on urban life.
- b) To assist NMRC in maintaining public approval of the Project and to foster willingness to put up with temporary inconveniences caused by construction.

*Note: Cost of advertisements and other publicity material shall be borne by NMRC.*

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## **2.16 Budgeting and Accounting**

- a) Estimate overall programme cost relating to the master implementation schedule
- b) Assess the financial position and project long-term financial statements.
- c) Certify all contract payments required to be made by NMRC and inform NMRC about any observations on the same.
- d) GC will assist NMRC in submission of disbursement claims to Funding Institution.

## **2.17 In the course of performing the Supervisory functions for the Project, GC will also:**

- a) Monitor all contracts in progress and identify any schedule or coordination conflicts, recommend measures to eliminate or mitigate problems and implement the recommended measures with the approval of NMRC.
- b) Conduct Performance reviews as desired by NMRC and bring in improvement in the designs carried out by Contractors and certify all work performed by Contractors. GC shall forward two copies of all engineering drawings, calculations and data to NMRC as soon as the documents are made available by the contractor.
- c) Continuous coordination will be required with various local authorities, and govt. departments for resolution of issues related to the implementation of the project. While the main coordinating agency will be NMRC, GC will be associated wherever required, to provide technical support, by way of data, drawings, sketches, and technical aspects of the issues.

## **2.18 Inspection, Testing and Commissioning**

- To have close coordination with the manufacturers who will follow the design, manufacture, installation, testing and commissioning of all plant equipment, rolling stock, signaling, automatic fare collection, power supply and control equipment, etc.
- To advise the NMRC on the final acceptance of the system based on the results of the prototype, serial and/or system test.
- During the maintenance period after the completion, the GC shall provide adequate and relevant staff to undertake necessary follow-up and monitoring and reporting to NMRC on completeness of all works, proper execution of works of all parties and any components of works to be checked up and maintained according to construction/supply contracts.
- The completed sections of the extension corridors of the project can be commissioned only after the sections are inspected by the Commissioner of Metro Railway Safety (CMRS) and the sanction is accorded by the Government for opening the section for passenger movements.
- GC shall prepare all the necessary documents required for CMRS approval and assist the employer in all respects, preparation and submission of all application forms, technical documents, etc. required as part of the CMRS inspection.
- GC shall assist in obtaining the Independent Safety Assessor (ISA) certificate by

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providing expert technical support throughout the safety assessment process.

- GC shall also assist the employer in furnishing technical clarifications to any queries sought by CMRS, including related document submissions, at any stage before, after or during the CMRS inspection.
- GC shall coordinate with the works contractors or any other project stakeholders, and ensure that all necessary approvals / clearances are obtained before the CMRS inspection.
- Any as-built measurements, survey works, design calculations, technical documentation, etc. required to be furnished as part of the CMRS inspection shall be coordinated and facilitated by the GC.
- Prior to the invitation to the CMRS for inspection of the line, the sections intended to be opened for traffic will be required to be subjected to the requisite trial tests. GC will plan, arrange, supervise and certify all these trial tests. if required with the support of NMRC staff, well in advance of the trial runs.
- GC will enable NMRC, giving all necessary assistance, to conduct the tests. The shortfalls noticed during the tests, GC will arrange to rectify through the contractors. In order that the deficiencies are limited to the minimum, the design and construction of the extension corridors of NMRC should take due consideration of the requirements under the relevant laws for the opening of a Metro Rail system for the Public Carriage of Passengers.
- All information as required to be furnished to the CMRS in connection with the section to be opened to traffic shall be tabulated and furnished by GC to NMRC for seeking the certification of CMRS for opening of the section(s) to traffic.
- GC will also prepare the documents required for any clearance from Railway Board/ RDSO and also attend the meetings with these Government agencies.

**2.19 Final Acceptance Standards and Handover:**

- a)GC shall carry out detailed inspection on completion of project and get rectified all defects noticed through contractors during inspection.
- b)GC shall establish a plan for commissioning procedures and monitor the commissioning process. Coordinate for final inspection, snagging, supervision of testing and commissioning of various systems, and assisting NMRC in taking over of various parts of works and of various systems
- c)GC shall witness testing & commissioning of all utilities and certify the same.
- d)GC shall co-ordinate with Vendors/ Contractors and arrange for user operation & maintenance manuals and training to client's representatives.
- e)GC shall co-ordinate and review accuracy and completeness of as-built drawings prepared by contractor(s) before submission of the same to NMRC. GC shall check and sign the as built drawings prior to handing over to NMRC and the inventory list.

**2.20 Defect rectification before handing over**

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- a) GC shall provide assistance/support in day to day inspection / monitoring of works before handing over and issue a timely notice to vendors/agencies for rectification of defects, if observed.
- b) GC shall carry out a detailed inspection and get rectified all defects noticed during such inspection through contractors before handing over.
- c) Records related to the project maintained by GC during project execution shall be handed over to the NMRC on completion of the project.
- d) GC shall facilitate handover of the Project complete in all respect, free from all encumbrances including the vacation of temporary workers' hutments etc. at site, if any to the NMRC.
- e) Lead a project post-completion review workshop to enable future improvements to design, construction and project management for future projects.
- f) GC shall provide project completion report which shall summarize the project activities, details of variations in the project from baseline schedule and scope. The report shall further provide Key Learning's from project management and construction management perspective for future phases / projects envisaged to be undertaken by NMRC.
- g) GC shall advise NMRC with regard to extra claims or disputes/ arbitration cases between NMRC and the contractor, if any, and assist in case of any dispute till the cases are resolved either by mutual negotiation or through Arbitration or Court as the case maybe.
- h) GC shall support NMRC for dealing with the Arbitration cases, if any, for contracts entered between NMRC and the design and build contractor. GC would prepare claims/counter claims, if so requisitioned by NMRC attend hearings and provide all necessary assistance to the Arbitrator, if required by NMRC, till final settlement of disputes which shall be as per Arbitration & Conciliation Act 1996. GC shall support NMRC for defending the legal case (provide the details, documents or analysis for dispute resolution in its possession/knowledge) on any matter for which dispute has arisen between two parties. The cost of arbitration/litigation, and award if any, arising out of any arbitration/litigation which was invoked due to reasons attributable to GC shall be borne by GC .GC shall take all necessary steps to safeguard NMRC interest while awarding the works to the GC.

**2.21 Preparation of Manuals for construction, administration, operation and maintenance of two extension corridors of Aqua line**

- a) NMRC set up for construction, management, operation and maintenance of the Metro Rail would require to prescribe Instruction Manuals for all its facets of functioning. GC would be required to develop draft manuals for approval and issue by NMRC, for regulating the functioning of the Metro.

The Manuals to be developed are:

- i) Track Manual
- ii) Civil Works Manual (Elevated)

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- iii) Signaling Manual (operation & maintenance)
- iv) Telecommunication Manual
- v) Commercial Manual
- vi) Operations Manual
- vii) Accident and safety Manual
- viii) Rolling Stock Manual
- ix) Electrical Traction Manual
- x) Environmental Manual
- xi) Quality Assurance Manual
- xii) Manual for lifts and escalators
- xiii) Climate Control Manual
- xiv) Security Manual
- xv) Disaster Management Plan Manual

These Manuals are intended to form the basis of the training of Operations and Maintenance personnel to be involved in these extension lines.

### **2.19 Training of Personnel of NMRC**

GC will plan and design the training modules for personnel of NMRC in operation, maintenance and repairs of various equipment and plants supplied by various suppliers, at OEM's premises. GC will also plan and design training modules for these personnel and METRO their trainers in operation, maintenance and repairs of the system as a whole and will provide training to them in these areas. The training will have to be arranged before commencement of the trials and will continue upto commissioning of the system.

### **3. Further responsibilities of general consultant**

The following will be further responsibilities of the General Consultant.

- i) GC shall at all times exercise all reasonable skill, care and diligence in the discharge of his duties. GC shall also be responsible for the accuracy and completeness of their works and the commissioning of the extension corridors of Aqua Line.
- ii) GC will be responsible to ensure that the goods and services used on the Project are appropriate, suitable and are reasonably costed. The designs and specifications adopted on the project should be such that they, in no way, limit the requirements regarding competitive bidding. It is also essential that the GC is and remains demonstrably impartial in the performance of its duties.
- iii) In performance of all services, the GC shall function in close co-ordination with NMRC.
- iv) The functions/activities of GC, including quality assurance and safety at work site will be monitored by NMRC. Required assistance for the same will be provided by GC. However, GC shall have overall responsibility in Quality Assurance matters.

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- v) GC will advise NMRC for engagement of all contractors, suppliers, manufacturers and other consultants and then be responsible for coordinating the effort and activities of all such agencies.
- vi) GC shall maintain full records relating to all aspects of the work covered by the project. Such records shall be made available at all times to the NMRC for inspection. Mere acceptance by NMRC shall not relieve GC of their professional obligations to correct at their own cost any errors in their work.
- vii) GC will assist NMRC for obtaining necessary environmental approvals as required from GOI/GOUP. GC shall monitor the progress in these matters and report to NMRC.
- viii) The tracings and other originals of all plans, drawings, engineering specifications and similar materials, and any data and all records or documents pertaining to the work, including soft copies thereof, shall be treated as confidential by GC and shall not, without written consent of NMRC, be made available to any person and shall be delivered to NMRC upon completion of the work and shall become the property of NMRC.

**4. Staffing by GC for the consultancy services**

Considering the multi-disciplinary nature of the two extension corridors of Aqua Line of NMRC, the GC's team is required to have expertise in the following disciplines (but not limited to the list):

- i. Project management/coordination
- ii. Rail/Metro Civil Engineering
- iii. Construction Planning
- iv. Station Planning/Architecture (Elevated)
- v. Geo-technical Engineering
- vi. Structural Engineering
- vii. Bridge Engineering
- viii. Track Technology
- ix. Quality Assurance
- x. Environmental & Social Impact Analysis
- xi. Traffic Engineering
- xii. Train Operations
- xiii. Utility Engineering
- xiv. Contract Administration (including dispute review and resolutions)
- xv. Electro-Mechanical Engineering (Elevated stations)
- xvi. Ventilation and Air-conditioning Engineering
- xvii. Communication Technology

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- xviii. Signaling
  - xix. Power Supply and Traction
  - xx. Rolling Stock
  - xxi. System Integration
  - xxii. Lift & Escalator
  - xxiii. Railcar Depot and workshop
  - xxiv. Automatic Fare Collection system
  - xxv. Energy consumption and conservation
  - xxvi. Financing & Accounts
  - xxvii. Safety and Security
  - xxviii. Property Development
  - xxix. Social Aspects
  - xxx. Fire Protection/Prevention
  - xxxi. Public Relations
  - xxxii. System integration & Commissioning
  - xxxiii. Rain Water Harvesting
  - xxxiv. Solar Power
  - xxxv. IT platform
- GC shall provide in its offer the proposal for staffing schedule for the entire period of the implementation of the project including the period of commissioning.
  - The sections intended to be opened for traffic will be required to be subjected to the requisite tests and trials under the construction contracts before the invitation to the CMRS for inspection of the line, and also during the operation period.
  - Staffing (Expertise required) for project, please refer Attachment -1 to volume 3
  - Fixed Costs:  
Fixed cost include but not limited to Consultants' expenses on hiring and retaining of supporting office staff, hiring and maintaining office accommodation, purchasing/hiring office furniture, consumables for general consultancy, hiring and maintaining vehicles for project area to discharge all duties in respect of General Consultancy, preparing and submission of reports and other documents and accounts, mobilization and demobilization of all expert, communication costs, electricity charges, Equipment, Stationery, conferencing and other overheads etc.  
Payment of fixed cost to be made as per the bidder quoted amount.

**5. Reporting System of the Progress of the Project**

## **5.1 Inception Report**

An Inception Report (6 copies in English and an electronic copy) shall be submitted by the GC to NMRC within one month from the starting date, presenting an initial technical appreciation of the services requirements and identifying both the overall work plan and the analytical steps (and associated assumptions) to reach solutions. It should prescribe the proposed service methodology, approach and provisional programme for completion of the Project.

## **5.2 Monthly Progress Report**

A Monthly Progress Report (6 copies in English and an electronic copy) shall be submitted by GC to NMRC. This Report shall be submitted by the 5<sup>th</sup> day of each calendar month and shall account for all work actually performed upto the end of the previous month. It should be submitted in a format approved by NMRC and shall contain sections/sub- sections for, but not be limited to, the topics listed below.

### **b) Progress**

- It shall describe the status of work performed during the previous month, significant accomplishments, including critical items and problem areas, corrective actions taken or planned and other pertinent activities and shall in particular, address interface issues, problems and resolutions.
- It shall include a simplified presentation of progress of the various parts of the contractual works in percentage terms compared with percentage planned derived from the Works Programme.
- The status of permanent and temporary staffing of GC.

### **c) Programme Update**

- The monthly programme update which shall be prepared by recording actual activity completion dates and percentage of activities completed upto the end of the month of report together with estimates of remaining duration and expected activity completion based on current progress. The Programme Update shall be accompanied by an Activity Report and a Narrative Statement.
- The Programme Status which shall show Works Programme status upto and including the current report period, display cumulative progress to date and a forecast of work remaining.
- The Activity Variance Analysis which shall analyze activities planned to start prior to or during the report period, but not started at the end of the report period, as well as activities started and/or completed in advance of the Works Programme.

### **d) Milestone Status**

A report on the status of all Milestones due to have been achieved during the month and forecasts of achievement of any missed Milestones, and those due in the next month.

### **e) Procurement Report**

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- A summary of all significant procurement activities performed by the contractors during the month and details of outstanding actions.
  - A report listing major items of plant and materials, which will be incorporated into the Works. The items shall be segregated by type as listed in the Specifications and the report should show at least the following activities:
    - Purchase order date - schedule/actual.
    - Manufacturer/supplier and origin.
    - Letter of credit issue date
    - Manufacturer/supplier shipping date - schedule /actual.
    - Method of shipment
    - Arrival date in India - schedule/actual
    - Analysis of any delay happened/anticipated with proposal for corrective measures.
- f) **Safety Report**
- A review of all safety aspects during the month including reports on all accidents, apprehended accidents and actions proposed to prevent further occurrence.
- g) **Financial**
- A review of all significant financial matters, payments due and made, and action proposed or taken in respect to any outstanding matters.
  - A schedule indicating the status of all variations and expenditure forecast.
  - A schedule of the status of outstanding claims (if any). The report shall in particular, provide interim updated accounts of continuing claims.
- h) **Points of Note**
- Public Relations.
  - Potential problems.
- i) Construction Completion report
- j) Environmental Management Plan
- k) Environmental evaluation report
- l) Training Plan
- m) Training execution and evaluation report
- n) Other technical as desired by NMRC

### **5.3 Final Report**

A final Report (6copies in English) shall be submitted by GC to NMRC. It shall contain, apart from other matters concerned, position of completion drawings, completion statements,

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contractors' disputes/claims etc.

**Table 5.1: Reports and Documents**

<b>Category</b>	<b>Type of Report</b>	<b>Timing</b>	<b>No. of Copies</b>
<b>Consultancy Services</b>	<b>Inception Report</b>	<b>Within 1 month after commencement of the services</b>	<b>6</b>
	<b>Monthly Progress Report</b>	<b>Every month</b>	<b>6</b>
	<b>Procurement Report</b>	<b>Every month</b>	<b>6</b>
	<b>Safety report</b>	<b>Every month</b>	<b>6</b>
	<b>Construction Completion Report</b>	<b>At the end of Services</b>	<b>6</b>
<b>Assistance in Environment Monitoring</b>	<b>Environmental Monitoring Report</b>	<b>Monthly</b>	<b>4</b>
	<b>Environmental Evaluation Report</b>	<b>At the end of the Project</b>	<b>6</b>
<b>Assistance in Training</b>	<b>Training Plan</b>	<b>At appropriate timing in accordance with the Inception Report</b>	<b>4</b>
	<b>Training Execution and</b>	<b>Within 1 month after training</b>	<b>4</b>

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	<b>Evaluation Report</b>		
<b>Other Report</b>	<b>Technical Report</b>	<b>As required or upon request</b>	<b>As required</b>
<b>Category</b>	<b>Type of Report</b>	<b>Timing</b>	<b>No. of Copies</b>
<b>Consultancy Services</b>	<b>Inception Report</b>	<b>Within 1 month after commencement of the services</b>	<b>6</b>
	<b>Monthly Progress Report</b>	<b>Every month</b>	<b>6</b>
	<b>Procurement Report</b>	<b>Every month</b>	<b>6</b>
	<b>Safety report</b>	<b>Every month</b>	<b>6</b>
	<b>Construction Completion Report</b>	<b>At the end of Services</b>	<b>6</b>
<b>Assistance in Environment Monitoring</b>	<b>Environmental Monitoring Report</b>	<b>Monthly</b>	<b>4</b>
	<b>Environmental Evaluation Report</b>	<b>At the end of the Project</b>	<b>6</b>
<b>Assistance in Training</b>	<b>Training Plan</b>	<b>At appropriate timing in accordance with the Inception Report</b>	<b>4</b>
	<b>Training Execution and Evaluation Report</b>	<b>Within 1 month after training</b>	<b>4</b>
<b>Other Report</b>	<b>Technical Report</b>	<b>As required or upon request</b>	<b>As required</b>

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**6. Duration of the Consultancy Services**

The duration of the consultancy services shall be for a period of total 48 months from the date of issuance of LOA,

**Expected schedule**

The total duration of consulting services for two extension corridors of Aqua Line of NMRC will be 48 months. The implementation schedule expected is as shown in Table 3.1.

**Table 3.1: Implementation Schedule Expected**

<b>Key Activities</b>	<b>Date</b>	<b>Duration in Months</b>
Commencement of Consulting Services		<b>48</b>
CMRS Sanction		
End of Consulting Services		<b>48</b>

**7. Services and Facilities to be provided by NMRC to GC**

- a) Provide rent-free air-conditioned office space of 360 Sq. M floor area (Approx) with reasonably adequate electrical switch points as required.
- b) Assist the foreign Consultant, Sub-Consultants and personnel to obtain work permits and such other documents as shall be necessary to enable the Consultants, Sub-consultants or personnel to perform the Services in India for this project.
- c) Issue to officials, agents and representatives of the Government, all such instructions as may be necessary for appropriate, prompt and effective implementation of the Services.
- d) Attendance for the all the staff shall be maintained and submit to NMRC every month for scrutiny. The amount support staff will be reimbursed on actual basis.

**8. Language**

The RFP application prepared by the Applicant and all correspondence and documents related to the RFP, and exchange by the Applicant and NMRC shall be written in English. Any printed literature furnished by the Applicant may be written in another language as long as such literature is accompanied by a translation of its pertinent passages in English, in which case, for purpose of interpretation of the RFP, the English translation shall govern.

**9. Governing Law**

The governing law for the purpose of tendering process is the laws of India and courts of Gautam Budh Nagar shall have full jurisdiction considering any matter arising out of

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this tender/contract.

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Attachment 1

<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
1	Project Director	1	Graduation in Civil engg.	20	10	48
2	Dy. Project Director	1	Graduation in Civil. Engg.	15	7	48
3	Structure Expert	1	Graduation in Civil engg. & M.E in Structural Engg.	15	7	48
4	Sr. Geotechnical Expert	1	Graduation in Civil engg. & M.E in Geotechnical Engg	15	5	12
5	Sr. Architecture Expert	1	B.Arch	15	5	48
6	Chief Track Expert	1	Graduation in Civil engg.	20	10	36

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<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
7	Sr. Track design Expert	1	Graduation in Civil engg.	15	7	24
8	Sr. Environmental Expert	1	Graduation in Civil engg./ Environmental engg/ Science	15	5	48
9	Sr. Social Safeguard expert	1	Master's in social / Anthropology	15	5	12
10	Sr. Quality assurance expert (civil)	1	Graduation in Civil engg.	15	7	48
11	Quality assurance expert (civil)	1	Graduation in Civil engg.	10	3	48
12	Sr. Quality assurance expert (system)	1	Graduation in Electrical/ E&C /Mechanical	15	7	48
13	Quality assurance expert (system)	1	Graduation in Electrical/ E&C /Mechanical	10	3	48

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<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
14	Sr. Safety Expert	1	PG /Certification in relevant professional field after graduation in Engineering	15	7	48
15	Sr. Girder casting and Launching Expert -1	1	Graduation in Civil engg	15	7	36
16	Girder casting and Launching expert	1	Graduation in Civil engg	10	3	36
17	Chief E&M Expert	1	Graduation in Electrical/ Mechanical	20	10	36
18	Sr. Illumination , Lifts, Escalator, Fire Expert	1	Graduation in Electrical / Mechanical	15	7	24
19	Chief Traction distribution,	1	Graduation in Electrical	20	10	24

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<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
	SCADA and MINIC Panel Integration Expert					
20	Sr. Traction power expert	1	Graduation in Electrical	15	7	24
21	Sr. Traction distribution, SCADA and MINIC Panel Integration Expert	1	Graduation in Electrical	15	7	24
22	Chief signalling expert	1	Graduation in Electrical/ E&C	20	10	24
23	Sr. Signalling expert	1	Graduation in Electrical/ E&C	15	7	24
24	Sr. Telecom Expert	1	Graduation in E&C	15	7	24
25	Engineer Telecom	1	Graduation in E&C	5	2	30
26	Sr. AFC Expert	1	Graduation in E&C	15	7	24
27	Engineer AFC		Graduation in E&C	5	2	30
28		1	Graduation in Electrical	15	7	24

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<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
	Sr. Rolling Stock expert (Electrical)					
29	Sr. Rolling Stock expert (Mechanical)	1	Graduation in Mechanical	15	7	24
30	Chief Testing & commissioning expert	1	Graduation in Electrical/Mechanical / E&C	20	10	18
31	Sr. Testing and commissioning expert	1	Graduation in Electrical/Mechanical / E&C	15	7	18
32	Sr. Operation & Maintenance Expert (Civil)	1	Graduation in any Engineering	15	7	6
33	Sr. Operation & Maintenance Expert (traction, telecom, AFC and E&M)	1	Graduation in Electrical/ E&C	15	7	6
34	Sr. Operation & Maintenance Expert (Rolling stock, S&T, Depot)	1	Graduation in Electrical/ Mechanical/ E&C	15	7	6
35		1		20	10	48

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<b>Sr. No.</b>	<b>Position</b>	<b>Minimum Requirement in Nos.</b>	<b>Minimum Educational Qualification</b>	<b>Total Experience after Minimum Qualification (years)</b>	<b>Minimum Relevant Experience in Metro/ MRTS/RRTS/ Railway after Minimum Qualification (years)</b>	<b>Man-Month Requirement</b>
	Chief contract expert		Graduation in Engg with PG/MBA in relative field			
36	Sr. Planning Manager	1	Graduation in Civil/ Certification on Prima Vera/ MS Project	15	7	48
37	Planning Manager	1	Graduation in Civil/ Certification on Prima Vera/ MS Project	10	3	48
38	Asset information Manager & BMS Manager	1	Graduation	10	5	48
39	Sr system integration	1	Graduation in E&C	15	7	48
40	Project Cordinator	1	Graduation in Civil/E&C/Mech.	15	7	18

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**Attachment 2 : Not used**