Annexure-A

Part-2, General Specification , Chapter-4 , Clause No.-4.2

4.2   5D BIM Interface Requirements

4.2.1   Employer is in the process of implementing an Enterprise wide IT system project titled "Digital Project Management Platform". The objective of the IT project is to develop a working environment that enables higher efficiency and effectiveness, not only in internal functions, but also across the entire ecosystem of the Employer including Contractors. The IT project envisaged following application stack:

(a) Collaborative document control and management services (using Bentley ProjectWise and AssetWise solution)
(b) Scheduling services (using Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM))
(c) Project Management with progress and performance reporting (using Primavera P6 & Unifier solution)
(d) Progress and performance reporting with visualization (using RIB iTWO)
(e) Enterprise wide ERP SAP implementation

4.2.2   The proposed IT system has been conceptualized for facilitating preservation of important artifacts (plans, drawings, notes, documents, reports etc.) in a secure and manageable environment in digitized format. Appropriate triggers shall generate dashboards and management reports every time an event causes a substantial shift in the project risk or a deviation in processes is developed. The envisaged system would expedite decision-making, ensure better planning and coordination between different functions, better data management, effective reporting, knowledge management etc. Program management shall provide senior management with critical information related to various contracts, activities and funds in the form of management dashboards with inbuilt triggers to ensure timely decision-making. Clause 4.2.6 details out the bidder's expected involvement on NMRCL's Digital platform

4.2.3   The effective use of such IT platform requires availability of system at all requisite locations i.e. with Employers' various offices, Engineer's offices, Contractors' end, major sub-contractors' end, design consultant ends etc. with certain definite users' rights. Data uploading by various authorized and trained users is key to effective implementation of the IT system. It is expected that contractor would have previously worked on the similar packages also it is understood that such envisaged IT platform is already a part of detailed scope of work of successful bidder. However, NMRCL has conceptualized the creation of a 5D BIM platform which would be the single collaborative environment among all stakeholders including contractors, General consultants, detailed design consultants etc. for efficient & seamless flow of information.

4.2.4   In view of the above, the Contractor shall be required to:

(a) Follow and comply the system guidelines to be issued by Employer/GC
(b) Comply all the software system competency.
(c) Upload / definition of Project Plans as per the template and using software defined by the Employer/GC;
(d) Maintenance and updating of uploaded Project Plans in software used by the Employer/GC;
(e) Upload of drawings / designs created by the Contractor as per the classification and on the software platform defined by the Employer/GC;

(f) Key contract related communication and progress related data as per processes defined on the software platform deployed by the Employer/GC

(g) Asset details need to be updated in the system in the format prescribed by the Employer/GC;

Bidder is expected to review section 4.2.6 for more details for bidder's expected involvement on NMRCL's Digital platform

4.2.5 Employer and its IT Implementation Agency shall render necessary assistance for the training of contractor staff.

4.2.6 Bidder will need to be accessing NMRCL's digital platform for at least the mentioned functions as applicable as per bidder's respective scope of work. However the function list is indicative and precise activities from bidder on NMRCL's digital platform will be updated and communicated to bidder on time to time basis.

Following are the deliverables in form of collaboration with 5D BIM by Bidder:

4.2.6.1 Creation of 3D engineered intelligent Models using discipline specific modelling/engineering applications.

4.2.6.2 Creating 2D drawings in CAD – plan, section, elevation and other relevant details (based on specific engineering disciplines) to be accessed by the contractors for construction.

4.2.6.3 Bidder need to comply with the following requirements in regards to the production of all the CAD (3D/2D) data files and building information modeling (BIM) work.

4.2.6.3.1 Model file production principles

1) Bidder need to follow British Standard BS 1192:2007+A2:2016 for Collaborative production of architectural, engineering and construction information - Code of practice as a guide for drawing practice, convention, CAD data structure and translation.

2) Bidder need to model all design and construction information as an individual discipline model and then collaborate it in single master 3D composite model, using object based software, allowing for 2D models to be extracted as required.

3) Bidder need to create and share details of individual components of 3D models for each discipline involved.

4) Bidder need to share all individual discipline models as well the collaborated single master model through the Engineering Information Collaboration System for review by GC/NMRCL. Clash detection and resolution process will run in this composite area. All 3D model data together with all 2D drawing extractions needs to be spatially coordinated with the Geospatial System. UTM/WGS84 coordinate system needs to be followed for proper geo-referencing of all the engineered 3D models that will be created.

4.2.6.3.2 Model file composition

1) Bidder need to generate model files using seed files/template (2D and 3D). Seed files/template will standardize all the new drawings that one creates. It will standardize the same global origin, color table, cell library attachments, working units, views etc.

2) Model files needs to contain one model view and one sheet view

3) All graphical elements need to be placed in the model view

4) Model files need to have a title box placed in the sheet view

5) All model files need to be created at 1:1 scale

4.2.6.3.3   Model Outputs

1) Within the engineering collaboration system the central premise is that only approved data is shared. Each discipline WIP area can only reference data from the shared area i.e. approved data. When this data comes together in the composite model it can be fully coordinated and composite renditions can be produced in 3D.

4.2.6.3.4   Model Reviews

1) Bidder needs to ensure that the level of complexity and granularity for each discipline CAD model is appropriate for the stage of Works.
2) Bidder needs to ensure that all disciplines integrate and coordinate their outputs in terms of both spatial and functional provision. This shall be demonstrated through the extensive use of coordinated design review sessions which shall include for the coming together of all relevant discipline models into a common master model (model composite) where engineering assurance and coordination checks shall take place.

4.2.6.3.5   Existing Infrastructure data sets

1) Bidder need to model existing infrastructure and systems in sufficient detail as to provide integration with the works under contract
2) Bidder need to clearly highlight the unresolved areas of non-coordination in structure/services/finishes/clashes on the drawings and the model at all times in case of existing infrastructure data sets
3) Bidder need to report back to the owner any discrepancy with the existing data for their action

4.2.6.3.6   Coordination and integration – Drawing Packages

1   Within the BIM environment each of the disciplines need to reference other models in a timely manner for coordination purposes. The head of each discipline group shall decide the extent and nature of supporting discipline data that shall be displayed in each of their own discipline drawing submissions. Clash detection software routines needs to be run on the multi-discipline model and on combined master models and any clashes resolved. The reports of which will be submitted on request of the Engineer
2   Specific drawing packages are required from each discipline. The drawings need to comprise of 2D extractions of the 3D models from the engineering collaboration system.
3   All CAD drawings need to be comprised of 2D models extracted from the 3D master model. Any subsequent design scheme changes that are required to be fully coordinated shall be modelled in 3D and the drawing extraction re-run to produce revised plots.
4   All plot composition files need to be checked as prescribed by the workflow setup in the engineering collaboration system before submission to the Engineer.

4.2.6.4 The bidder shall take full advantage of the 3D object attributes available in the BIM environment to prove cost, constructional logic, fabrication, and program as required by the NMRCL/GC. Engagement modality expected for Project Management works including 4D & 5D BIM requirements: -

1. Bidder shall allocate a Project Coordinator who would be a single-point contact for NMRCL for monitoring day-to-day progress on the Project.

2. Bidder will access the web-based Project Monitoring application (Primavera) of NMRCL

3. Bidder will have to create Work Breakdown Structure (WBS) for its scope of work in the master project prepared and released by NMRCL on Primavera.

4. Bidder will have to create all the relationships between various activities to generate a Critical Path Network on Primavera.

- The project plan will be detailed to reflect the planned construction progress as per the 3D BIM model. This is must, as Primavera plan will get linked to 3D BIM collaborated intelligent model to reflect and review time based planned progress of project on a BIM model. Bidder's project plan on NMRCL Primavera platform will be required at this level.

5. Once the network has been scheduled and baseline by NMRCL/GC, the Project Coordinator will have to provide periodical updates for various activities.

6. Bidder will also be required to furnish key cost / budget details along with resources on NMRCL's Primavera platform. Level of details for time plan, cost, and resources from bidder will be communicated to bidder at appropriate stage.

7. During the execution stage bidder will be required to operate on NMRCL's Primavera platform to reflect minimum details towards work performed, progress achieved, resources consumed, forecast dates, forecast resources, remaining work along with any other key details as required by NMRCL / GC. NMRCL will be communicating on level of details as well frequency of such interactions at appropriate stage.

8. Bidder shall update and revise their work program on the integrated master schedule of the project subject to directions & approval from NMRCL.

9. Bidder will be required to periodically capture actual progress visualization of respective package work using suitable technology which can be updated in 5D BIM platform.

4.2.6.5 In order to adopt 5D BIM platform bidder need to follow Employer's Information Requirement (EIR) Document which will be prepared by Owners Support Office (OSO) in consultation with General Consultant (GC) and handed over to the Bidder. The EIR will enlist the standards, methods and procedures that one has to follow in order to be BIM Compliant. EIR will have details such as CAD standards, BIM standards, Asset Dictionary, Asset Classes, file naming convention, layer naming convention, Attribute Standards, etc.

4.2.6.6 SAP ERP (Component of Digital Project Platform):
In order to adopt SAP ERP platform contractor will be required to follow Employer's Information Requirement (EIR) Document which will be prepared by OSO in consultation with General Consultant (GC) and handed over to the contractor. The EIR will enlist the standards, methods, procedures and data related to defined functionality coverage in SAP ERP.

4.2.6.7 Minimum login credentials (as decided by NMRCL) per bidder will be provided by NMRCL to the bidder to access NMRCL digital platform as per clause 4.2.3. In case, bidder envisages more user licenses for their internal data preparation through their internal user (like detailed drawing or project plan preparation by multiple users) which is required for finalizing data to be entered in NMRCL's digital platform, then it will be bidder's responsibility to ensure own licenses. However the access to NMRCL's digital platform will be through provided user credential only.

4.2.6.8 The engineering collaboration platform will be provided by NMRCL and is mandated for the structure and the controlled sharing of the information created during the process.