

**THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
TWO MONTGOMERY STREET - 1st FLOOR
JERSEY CITY, NJ 07302**

October 9, 2018

ADDENDUM NO. 3

TO PROSPECTIVE BIDDERS ON CONTRACT **EWR-154.306** – NEWARK LIBERTY INTERNATIONAL AIRPORT – REHABILITATION OF RUNWAY 11-29

The following changes are hereby made in the Contract Documents for the subject Contract.

This communication should be physically annexed to back cover of the book and initialled by each bidder before submitting his bid.

In case any bidder fails to conform to these instructions, his Bid will nevertheless be construed as though this communication had been so physically annexed and initialled.

CHANGES IN THE CONTRACT BOOKLET

Page iv - Immediately following the eighth line, insert the following new line:

"85A. BUILDING INFORMATION MODELING REQUIREMENTS.....125"

Page 125 - Immediately preceding clause 86 entitled "SUBSTITUTION", insert the following new clause:

"85A. BUILDING INFORMATION MODELING REQUIREMENTS

The Contractor shall use a BIM (Building Information Modeling) methodology to develop and submit a "Construction Model" and a "4D/5D Model". Together these Models shall be used for spatial coordination, quantity takeoff reports, submittals, scheduling construction phasing and logistics, tracking work progress and completion, and cost tracking. The Construction Model shall be comprised of multiple linked model files (Autodesk Revit .RVT files, Autodesk Civil 3D .DWG files, or any Port Authority approved file type). A 4D/5D Model shall be developed by linking events in the construction schedule to elements in the Construction Model. During construction, the Contractor shall continuously incorporate revisions to the Construction Model and the 4D/5D Model to reflect the current level of completed Work.

Construction Model Requirements:

- A. Within 45 calendar days of the acceptance of the Contractor's Bid, the Contractor shall prepare and submit to the Engineer a Construction Model developed from and based on the Contract Drawings, including underground utilities. In the event existing BIM models or CAD files in support of the Contract Drawings are provided for reference, these files shall not relieve the Contractor of their sole responsibility for verifying accuracy of conditions indicated within these files. For project geometry and layout, the Construction Model shall be the only source of information (single coordinated database).

For performance requirements, finishes, and additional product information, Contractor shall refer to other Contract documents.

- B. The bi-weekly Construction Model updates shall reflect all approved shop drawing changes, RFIs, Change Orders, approved submittals, and accurate geometry/locations for all constructed elements. All disciplines, sub-consultants, and subcontractors shall deliver their portion of work using BIM without exception unless specifically approved in writing by the Engineer. The Construction Model shall be submitted two days prior to each bi-weekly progress meeting with the Engineer.
- C. The Contractor shall use the most-current version of Autodesk's Revit and Navisworks software in use by the Authority at the time of acceptance of Bids as identified in the BIM Standard Manual. The Contractor shall provide the software, hardware and training required to comply with the BIM Requirements in the Authority's "E/A Design Division BIM Standard Manual" (hereinafter called "the BIM Standard Manual". The Contractor shall develop and maintain the Construction Model in compliance with the version of the BIM Standard Manual in use on the date of acceptance of Bids, as made available online at <http://www.panynj-cadstandards.com>. Modeling shall follow these additional guidelines:
- 1.) A control model shall be created for levels, grids, and shared coordinates. All model authors shall use this to establish a common baseline. An Autodesk Revit Site Model ("SM") will be created by the Port Authority BIM/CAD Support Group and delivered to the Contractor. This file holds the project coordinate system and controls the location, rotation, and elevation of all Revit-based Models (Architectural, Civil, Electrical, Electronics, HVAC, Plumbing, Fire Protection, and Structural) linked to it. All Models shall be linked by Shared Coordinates and coordinated with the SM, as identified in the BIM Standard Manual.
 - 2.) Grids shall be to the nearest 5mm increment apart to 10 decimal places, and shall be orthogonal to 10 decimal places, or if not orthogonal at an angle with no more than 2 decimal places.
 - 3.) Correct "Categories" and "Types" shall be used to identify each model element.
 - 4.) All model elements in the authoring models shall be in the authoring BIM software format. Imported geometry of a format different from authoring software shall not be used.
 - 5.) All 3D models shall be consistent with the 2D details and information, and all model elements shall match issued schedules.
 - 6.) Where appropriate, typical groups of elements can be grouped and copied around the model. There should be no groups with only one occurrence.
 - 7.) Elements, including groups and nested components, shall not be mirrored where doing so creates a different product. (e.g., a dishwasher with an outlet on the left is a different product to a dishwasher with an outlet on the right). Mirrored versions shall be a separate element, group, or nested component than the original.
 - 8.) All dimension entities shall be rounded to the nearest 1 millimeter, no

- higher (or rounding errors may occur in strings of dimensions). Dimension values shall not be overridden.
- 9.) All tags and identifying marks on drawings shall match parameter data within the objects being tagged or identified.
 - 10.) Deliver 3D models as separate files per discipline with the Base Point in each set to the same coordinates.
 - 11.) All 2D drawings and 3D models used as references and appearing in issued drawings shall be provided with the host file. Pathing of linked files shall be relative and not absolute.
 - 12.) When requested by the Engineer, editable 3D geometry and data shall be issued in native authoring formats (e.g. RVT, DWG, DGN, Moss Genio, ASCII etc.) as well as published formats (i.e. PDF, NWC, DWF etc.).
 - 13.) Ensure that the exported models retain unique element identifiers (i.e. that there is a globally unique identifier associated to each element that is not duplicated by another element in the model). Ensure consistent use of IFC GUIDs across exports (same model). If the same model is exported multiple times, the IFC GUIDs for the same objects shall stay the same.
 - 14.) Ensure that all elements are modeled as individual selectable items rather than multiple elements modeled as one element (e.g. don't model a row of columns as a single column element).
 - 15.) Modeling of Civil components shall be completed using the version of Autodesk Civil 3D currently in use at the Port Authority. Modeling of Civil components shall include, at a minimum, all underground utilities (ductbanks, piping networks, and associated fixtures such as manholes and catch basins), profiles of roadways, and any existing utilities that are tied into (manholes, valves, etc.). Internal components such as conduits in ductbanks need not be modeled.
- D. Within 30 calendar days of the acceptance of the Contractor's Bid, the Contractor shall prepare and submit to the Engineer a BIM Execution Plan (hereinafter called the "BEP"). The BEP shall be revised throughout the Contract to adjust for necessary changes in standards, staff/roles, workflows, and schedules, and shall be submitted for approval as requested by the Engineer. A template is included in the BIM Standard manual (Appendix A – BIM Execution Plan Template) for use by the Contractor as a basis for their BEP. The BEP shall include, at a minimum, the following:
- 1.) The name and contact information for the Contractor's designated BIM Coordinator, and each subcontractor's designated BIM Coordinator. BIM Coordinators shall have experience in coordinating the adoption of BIM processes in similar construction Contracts from bid stage through construction and handover, and experience in using BIM authoring software herein specified.
 - 2.) How BIM will be used for coordination meetings with the Engineer during construction. Coordination/clash detection process including provision of a matrix template of clashes to be analyzed.
 - 3.) The coordination process among all contributing parties involved in construction.

- 4.) List, description and scope of BIM Models to be developed (Construction Model, 4D Model, As-Constructed Model).
 - 5.) Detailed Model Breakdown Structure and articulation of Level of Development (LOD) compliance (including strategy for all discipline Models and approach for detailing, accessories, landscaping features, furniture, etc.).
 - 6.) Process for collecting information required in the Port Authority issued Shared Parameter file.
 - 7.) Development procedures for schedule (4D) and cost (5D) analysis, including workflow procedures for the 4D/5D Model.
 - 8.) Flow diagrams demonstrating how the model will be used in the field, including process for capturing As-Constructed conditions with laser scans.
 - 9.) Unique Element Identifier (UEI) Execution Strategy defining the approach, the elements included and excluded from this effort, resources, timeframe, and other necessary considerations
 - 10.) File naming and versioning in accordance with the BIM Standard Manual.
- E. The Contractor shall develop and maintain a 4D/5D Model. The 4D/5D Model shall be created by integrating the construction schedule into the Construction Model with Autodesk Navisworks. This integration shall be accomplished by linking Construction Model elements to discrete activities in the cost-loaded Primavera P6 Project Schedule. Model components shall be created in accordance with the project's Work Breakdown Structure (WBS). The Contractor shall maintain the 4D/5D Model to be up-to-date throughout the duration of construction and submit the 4D/5D Model with the Construction Model for each bi-weekly progress meeting with the Engineer. The Contractor shall prepare 4D/5D simulations to show construction sequencing and any schedule changes. The 4D/5D Model shall include the approved baseline schedule and the latest updated schedule including two-week look-ahead. Submissions for the 4D/5D Model shall be in Autodesk Navisworks .NWD file format and all files used in its creation shall be included in each submission. The first 4D/5D model submission shall take place two weeks prior to the date on which the first activity on the construction site begins. The 4D/5D Model shall demonstrate the planning and staging of construction, cost breakdown, and shall include, at a minimum, the following:
- 1.) Demonstrate the planning and staging/sequence of construction, planned vs. actual progress, cost breakdown, and demolition and logistics activities (including delivery of and movement around the site of any major construction equipment that may impact facility operations).
 - 2.) Cost-load the schedule to provide quantity-based, installed cost breakdown of labor and material for major elements of all Models.
 - 3.) All activities from the Project Schedule, including those that are not linked to objects shall be imported into Navisworks. All activities linked to 3D objects shall be linked by Activity ID to corresponding Autodesk Navisworks Selection or Search Sets with the same name. The naming of Activity IDs and matching Navisworks Selection or Search Sets shall begin with the project's contract ID number as a prefix. Activity ID shall

- be assigned as a parameter to objects in Revit to allow for cost integration of each Model object and Search Set creation within Navisworks.
- 4.) Activities shall be logically grouped and linked to the Model, and the process for accomplishing this shall be defined in the BEP. If Level of Effort activities are used, all predecessor/successor relationships must remain intact in order to accurately simulate the schedule, and no activities shall be duplicated for the sole purpose of linking to an object. All activities in the 4D/5D Model shall come directly from the schedule developed in Primavera P6, and task creation within Autodesk Navisworks is prohibited, unless authorized by the Engineer.
 - 5.) For easy identification of activities linked to geometries in the 4D/5D model, the Contractor shall use an Activity Code in Primavera P6. This Activity Code shall be labeled "BIM.ContractID#", and it shall contain the value "BIM.ContractID" for all activities linked to objects in the Model.
 - 6.) The Activity Codes from Primavera P6 shall be mapped to User Defined Fields in Autodesk Navisworks when importing the schedule into the 4D/5D Model.
 - 7.) Appearance definitions shall include at a minimum task types and colors for the following:
 - a. Demolition
 - b. Temporary Construction
 - c. Construction
 - d. Staging
 - 8.) The 4D/5D Model shall initially be submitted with the Original Baseline Schedule submission and subsequently align with all monthly Progress Schedule submissions. Both the Baseline Schedule and most recent Progress Schedule generated in Primavera P6 shall be integrated into the 4D/5D Model for each monthly submission.
- F. The Contractor shall make required model update submissions for review, including a BIM Standards compliance review by posting files to the Contract's Livelink web site. Submissions shall include the current Construction Model and current 4D/5D Model, description of updates made to the Models and all necessary linked files to ensure a comprehensive, coordinated submission (including .RVT, .NWD, and .XER schedule files).
- G. Prior to issuance of the Certificate of Final Completion, the Contractor shall submit to the Engineer a final As-Constructed Model. The Authority will have thirty (30) days to review the final model submission, and the Contractor shall have an additional thirty (30) days to incorporate all comments to the satisfaction of the Engineer to complete this requirement.
- H. During construction, the Contractor shall produce 3D laser scans of the construction to capture existing conditions in addition to site survey requirements from the Contract documents. The Contractor shall ensure that all laser scanning is performed before any of the work becomes hidden or concealed. The Contractor shall match the Construction Model geometry to the resultant laser scan point cloud as items are installed and throughout construction. The resultant model created by matching the Construction Model geometry to the laser scan point cloud shall be known as the "As-Constructed

Model". The Contractor shall submit copies of the latest laser scan point cloud files with every bi-weekly submission to allow the Engineer to review the accuracy of the Models as compared to the laser scans throughout construction.

- I. Level of Development (LOD) as defined in the American Institute of Architects (AIA) Document E203-2013 shall mean the level of completeness to which a Model is developed along with its minimum requirements. The Contractor shall deliver a final As-Constructed Model at LOD 400. The As-Constructed Model shall be developed with an accuracy tolerance of not more than +/- 1/8". The Contractor shall ensure all field condition changes are accurately documented in the As-Constructed Model, including underground utilities. Elements in the As-Constructed Model shall be accurate in terms of their field verified quantity, size, shape, location, and orientation, and shall include complete fabrication, assembly, detailing information, specifications, and other relevant information as approved by the Engineer. The Contractor shall capture values for all attributes found in the latest Shared Parameter file issued by the Port Authority and include in the BIM Execution Plan the methodology anticipated for collecting this information. Attributes shall be assigned to model elements in accordance with the PANYNJ Asset Attributes List.
- J. For Bridge projects only, the Contractor shall implement and include in the final As-Constructed Model the UEI (Unique Element Identifier) as defined within the Port Authority UEI Guidelines provided as a reference document. Necessary parameters for constructing the UEI will be provided in the Port Authority Shared Parameters file. The Contractor shall prepare a UEI Execution Strategy defining their approach, the elements included and excluded from this effort, resources, timeframe, and other necessary considerations, and submit to the Engineer as part of the BIM Execution Plan within 30 calendar days of the acceptance of the Contractor's Bid.
- K. The Authority may deny a progress payment request and/or withhold money, or modify any previous progress payment, as necessary to protect the Authority from loss due to or affecting enforcement of failure to keep current as-constructed records at the construction site, including the BIM. Prior to monthly payments, the Engineer shall review the Contractor's models to verify that all revisions are up-to-date. In the event the Contractor's deliverables are not updated, the Authority may withhold the monthly payment until the Models are revised to reflect the correct information."

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

James Starace, P.E.
Chief Engineer/Director

INITIALLED BY THE BIDDER:
