**SECTION 010012X BUILDING INFORMATION MODEL (BIM) USE DURING CONSTRUCTION**

# PART 1 – GENERAL

# 1.1 DESCRIPTION AND INFORMATION

The work to be performed under this Section includes, but is not limited to, the furnishing of all materials, labor, tools, equipment, services, and incidentals required to provide and maintain BIM information and model current and up to date during construction in accordance with the requirements of “MDOT MAA BIM Standards for Design and Construction Contracts at BWI Thurgood Marshall International and Martin State Airports (MDOT MAA BIM Standards)”. This includes preparation of a BIM Execution Plan (BxP), approved by the Engineer, and monthly submissions of Clash Detection Reports, as well as, updated As-Built Revit (.rvt) model reflecting the installed geometry and equipment data necessary for a minimum Level of Development - LOD 300, as defined in “BIMForum, AGC LOD Specification (<https://bimforum.org/lod/>).

The MDOT MAA BIM Standards are available online at <https://www.airportal.maa.maryland.gov>, and is hereby incorporated into these specifications by reference. MDOT MAA BIM Standards include the latest versions of the following documents:

1. MDOT MAA BIM Standards for Design and Construction Contracts at BWI Thurgood Marshall International and Martin State Airports (MDOT MAA BIM Standards).
2. MDOT MAA BIM Execution Plan Template (BxP).
3. MDOT MAA Revit Template.

The final deliverables, at minimum, shall include “.dwg” as-built drawings delivered to the Engineer by the Contractor within 60 days of contract completion.

## **1.2 REFERENCED STANDARDS AND DOCUMENTS**

All work related to this item shall be in accordance with the latest standards and references, including but not limited to:

1. National BIM Standard (NBIMS) – United States™
2. AGC BIMForum LOD Specification™ 2017
3. MDOT MAA BIM Standards
4. BIM Execution Plan Template
5. Conformed BIM Execution Plan (supplied by Design Team)
6. Conformed Design Model (supplied by Design Team)

# 1.3 MODEL WORKFLOW

**NOTE TO ENGINEER** – Engineer shall add to this section as required for items related/unique to the project.

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| **BIM Execution Plan Life Cycle** |
| **Design Phase**  | **Bidding Phase**  | **Construction Phase** | **Final Deliverables** |
| **Design Intent Bid Model and Drawings** | Comments made to **Bid Design Intent Model** by contractors during procurement | **Conformed Model** to the Contractor  | **Record Model****.rvt**based upon the **Conformed Model** | **As-Built Model. Navisworks** | **Record Drawings** |
| Provided for Bid Process by Designer | Approved changes made by design team and issued by addendum(s) – Becomes the **Conformed Model** | Conformed .rvt model basis of **Record Model** | Navisworks and Shop Models basis of **As-Built Model** | Developed by Designer with as-built changes.  | Navisworks model of higher detail LOD 350 or higher based upon shop model information | AutoCAD drawings with As-Built information |
| Design Phase BIM Execution Plan provided to contractors during contract procurement | Construction Phase BIM Execution Plan | Final BxP provided to MDOT MAA by the Contractor |

## **1.3.1 Design Intent Model and Drawings.** Bid Model delivered to MDOT MAA by the Designer for bidding purposes. This federated Revit (.rvt) model is the basis of the construction documentation and includes the linked drawings. The prospective contractors will receive the Design Intent Bid Model prior to submitting a bid, so that the contractors can submit any questions, deficiencies, or errors in the model and documentation.

## **1.3.2 Conformed Model.** The Design Intent model updated by the Designer with any/all addenda incorporated. The resulting model is the Conformed “.rvt” Model. The selected contractor shall receive the Conformed Model and the design phase BIM Execution Plan (BxP) prior to the Construction Notice to Proceed (CNTP). The contractor shall be responsible for maintaining and real-time updating the Conformed Model during construction.

## **1.3.3 Construction Model & BIM Execution Plan (BxP).** The contractor shall utilize the Conformed Model for BIM construction requirements, such as quantities, shop model development, and constructability reviews.

* 1. **BIM Execution Plan (BxP).** The contractor shall supply a Construction Phase BIM Execution Plan (BxP) with the Contractor’s Final Detailed Schedule #1 due 30 calendar days from Notice of Recommended Award (NORA). This will identify how the model will be used, responsible parties, Level of Development (LOD), review and submission schedules. BIM Execution Plan shall include:
1. Identification of Models that are created and their BIM Uses (purpose)
2. Data for equipment objects – LOD for geometry and data
3. Established coordinate system shall be checked and remain
4. Established unit conventions shall be checked and remain
5. Conventions for defining critical dimensions and critical Model content
6. File formats used
7. Quality Control and Clash detection procedures
8. Data security
9. File structure used – per MDOT MAA BIM Standard for deliverables
10. File-naming and object-naming conventions – per MDOT MAA Standard for deliverables
11. Software versions - .rvt of Design Intent Model
12. Procedures and protocols for confirmation of field changes
13. Use of model content in collaboration meetings and project issue communications
14. Connectivity to project schedule
	1. Submit BxP to the Engineer for approval. The Engineer shall return comments within 21 Calendar days. Deficiencies in the BxP identified by the review process shall be corrected and a revised plan shall be submitted within 10 calendar days of the receipt of comments. This review and revision process shall repeat until the BxP is approved but must be completed prior to CNTP.
	2. Conduct a BxP review at the initial Construction Review Meetings for clarification, and to verify the functionality of the Model, technology, workflow, and processes. Additional processes or activities shall be incorporated into the BxP based upon review. If modifications are required, the Contractor shall execute the modifications and resubmit the final BxP for approval.

# 1.4 SHOP MODELS

Shop models shall be federated in Navisworks for clash and constructability reviews. These models and shop drawings shall be submitted for the Engineer’s review and approval. The minimum duration for this activity shall be twenty-one (21) calendar days. The Clash Detection report shall include the resolution activity and schedule for resolution. MDOT MAA, their agents, and Designer shall have access to the updated model during construction for review.

# 1.5 RECORD & AS-BUILT MODEL AND DRAWINGS

## Additional requirements to Standard Provisions for Construction Contracts Volume 2, SP-8.08-Record Drawings/As-Built Drawings.

## **1.5.1** The Contractor shall supply monthly as-built information in drawings and “.rvt” model. This includes any changes in model geometry to reflect as-installed and as-built conditions at a defined level of development (LOD 300) and required asset data specified by MDOT MAA. If issues are found the Contractor shall complete the corrections and return the As-Built marked drawings and model to the Engineer within ten (10) calendar days.

# PART 2 – PRODUCTS AND REQUIREMENTS

**NOTE TO ENGINEER – Engineer may add to this section as required for items related/unique to the project.**

# 2.1 SYSTEM REQUIREMENTS

1. Computer with enough compute power, graphics card, and RAM to manipulate the model in review meetings, perform clash detection, and model integration.
2. On-site Network Capability

# 2.2 SOFTWARE REQUIREMENTS

## Revit version used by design team on project

## Navisworks

## Blue Beam

## Solibri

# PART 3 - EXECUTION

# 3.1 BIM DELIVERABLES

**NOTE TO ENGINEER – Engineer may add to this section as required for items related/unique to the project.**

## **3.1.1** As-built Documentation and BIM deliverables shall conform to SECTION 8 of the Standard Provisions.

## **3.1.2** Deliverables Required Prior to CNTP: The following deliverables shall be provided under this section. Project startup deliverables:

1. BIM Execution Plan (BxP): Due 30 calendar days from Notice of Recommeded Award (NORA). Allow 14 calendar days for comments. Resubmit for approval based upon comments. Process of review and resubmission of the BxP shall continue until acceptance by MDOT MAA. This activity is considered incidental to this pay item and no separate payment will be made to the Contractor.

## **3.1.3** Deliverables Required During Construction Phase

1. As-built Model (rvt.) Monthly submission of updated model and drawings to include work performed during the previous 30-day period.
2. Updated BIM Execution Plan (BxP) when any changes occur.
3. Monthly submissions of Clash Detection Reports and the updated Navisworks integrated model for reviews
4. Shop Models –In accordance with Special Provisions SP-8.06

## **3.1.4** Project deliverables required at project closeout: Record Drawings, Record Model, and Navisworks Model, and Record Drawings with as-built information are required deliverables at the completion of construction.

1. Submit final Record and Navisworks Model within 14 calendar days of notification of substantial completion.
2. The Design Team shall have 21 calendar days to review the Record Documents and Model and issue comments.
3. Upon receipt of Design Team’s comments, the Contractor shall complete revisions to the model and record documents and resubmit within 14 calendar days. This review and revision process shall repeat until all comments are addressed and the model is approved.

# PART 4 – METHOD OF MEASUREMENT

# 4.1 BUILDING INFORMATION MODEL (.rvt) MONTHLY UPDATES

## Payment under this item for each monthly update submitted on schedule and approved by MDOT MAA shall be made in equal monthly installments based upon the lump sum bid amount divided by the contract construction schedule duration (in months). Monthly payments shall be forfeited for any month that an acceptable update is either not submitted or is submitted more than 5 calendar days late. The lump sum paid for this item shall be considered full compensation for performing the work specified herein and for furnishing of all materials, labor tools, equipment, and incidentals necessary to complete the work to the satisfaction of the Engineer.

**4.2 FINAL AS-BUILT MODEL – AS BUILT CONDITIONS**

## Payment under this item shall be made as a single lump sum upon MDOT MAA acceptance of the final model. The lump sum paid for this item shall be considered full compensation for performing the work specified herein and for furnishing of all materials, labor tools, equipment, and incidentals necessary to complete the work to the satisfaction of the Engineer.

# PART 5 – BASIS OF PAYMENT

## Payment will be made under:

Item 010012X-1 Building Information Model (rvt.) Monthly Updates - (Lump sum amount bid shall not be less than $XX,XXX.00) – per lump sum

Item 010012X-2 Final As-Built Model - As-Built Conditions - (Amount bid shall not be less than $XX,XXX.00) – per lump sum

**END OF SECTION 010012X**