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**The Great Lakes Region 5 Standard Template**

**for**

**Building Information Modeling (BIM) Statement of Work (SOW)**

**Prospectus & Non-Prospectus - Level Projects**

**Collaborative GC Delivery Method**

**VERSION 4.0**

Released: 7/1/2013

**U.S. General Services Administration**

**Public Buildings Service**

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**Statement of Work**

**for**

**Building Information Modeling (BIM) Services Contract**

**PROJECT IDENTIFICATION**

Project Name:

Project Number:

Region:

Building Name:

Building Address:

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# General Requirements

## Building Information Modeling (BIM)

The General Services Administration, hereinafter referred to as the GSA, has chosen a collaborative delivery method for this project. Collaborative delivery, as practiced by GSA, is BIM-based and puts the interest of the project above the individual team members. All members of the project team are expected to be committed to the use of 3D/BIM in the project, share their areas of BIM expertise with the team, provide the BIM data as requested by other team members, look for cost savings and schedule improvements during the entire project duration, and endeavor to leave as a legacy a fully updated, “as-built” facility management ready BIM.

BIM can enable improved workflows between project partners by:

* Using BIM (with smart objects) for analyses and to generate drawings
* Using BIM for visualization and spatial data management
* Reducing redundancies (inherent in silo-based activities) by sharing BIM data
* Increasing coordination by sharing/integrating subsystem models
* Improving the design-to-construction hand-off
* Improving communication of design &/or construction sequencing using 4D
* Building the project virtually before it is built in reality

The effort required to properly deploy BIM across a project team should be largely off-set by reducing silo oriented, paper based data exchanges/tasks elsewhere in the project, and the team will need to be mindful of potential work shifting. Conversely, BIM added to existing silo-based processes will generate less than optimal results and teams are encouraged to look for opportunities for BIM to streamline work processes.

### AE Responsibility

The Architect/Engineer (AE) will provide to the GC and other team members a BIM to facilitate the project’s design/construction and GSA BIM objectives as outlined in this SOW. The model developed by the AE will properly use intelligent elements that embody information about the building component requirements and properties (e.g., material properties, functional information, dimensions, etc). The A/E is responsible for adhering to the minimum data requirements as specified on the Region 5 BIM Standards Site.

The BIM must be constructed to allow the project team to use the information for one or multiple BIM analysis applications.

### GC Responsibility

The GC must provide to the AE after project award their construction BIM requirements to leverage the models developed by the AE during the design stage to maximize compatibility with the GC modeling capabilities for the construction phase.

## Basic Conditions

If the AE or GC cannot perform tasks defined within this scope, the tasks may be assigned to another team member or third party with the requisite expertise and approval of GSA. This third party must adhere to all conditions of the Region 5 BIM Standards as well as any agreements defined within the projects BIM Execution Plan.

Construction documents must be derived from the BIM. At no time should parallel efforts of a separate 2D workflow be practiced. All construction documentation is to be directly produced from the model with the exception of some details.

BIM development and deliverables shall be coordinated with the stages/phases outlined in the AE Scope of Work.

### AE Responsibility

AE is to submit as part of its proposal complete resumes for key BIM related personnel. These include at a minimum the BIM Integrator and the BIM Quality Representative. Depending on the size of the project this may be the same individual.

### GC Responsibility

GC is to submit as part of its proposal complete resumes for key BIM related personnel. These include at a minimum the BIM Integrator and the BIM Quality Representative. Depending on the size of the project this may be the same individual.

## BIM Enabled Design and Construction Coordination

The project team, in conjunction with the GSA Project Manager (PM), must determine how requirements outlined in the GSA BIM Guide Series, Region 5 BIM Standards and refinement of this SOW will best serve the project interests.

BIM should be used to enable the project through improved workflows and the process of BIM enabling must be recorded via a BIM Execution Plan as explained later in this SOW.

### AE Responsibility

Coordinate a meeting with the GSA at the onset of design to present the AE’s use and knowledge of BIM in other projects. GSA will discuss owner expectations, use, integration, and further development of the model at this meeting. The AE must coordinate and schedule with the GSA Project Manager a BIM Execution Plan Kick-Off.

The AE and GC must conduct for the project team coordination, constructability and clash/collision review meetings that integrate all design models into a common **NavisWorks** environment. The AE must coordinate with the GC throughout the design stage of the project to develop models that are compatible with the GC’s modeling needs and capabilities during the fabrication and construction stage of the project.

### GC Responsibility

In collaboration with the AE, provide and integrate 3D geometry such that the model(s) is compatible with clash detection software to enable design and construction coordination across different design disciplines. The AE and GC must deliver 3D geometric and/or BIM models that have already been coordinated to highlight, minimize, or eliminate clashes and interferences. The AE and GC must coordinate with the design team (e.g., structural engineer, MEP engineer, steel fabricators, MEP sub-contractors etc.). The AE and GC must build upon the components found in the 3D geometric model(s) or BIM(s) and the [GSA BIM Guide](http://www.gsa.gov/bim) Series

## BIM Execution Plan(s)

BIM Execution Plans (BEP) are required of the AE and, if appropriate, may be required of the GC. BEPs are to be submitted to the GSA PM and Regional BIM Champion 30 days after contract awards. Intent is to convey to the GSA and project partners the proposed *process* to perform BIM enabled analyses and tocollaboratively review and exchange BIM data to improve design to construction workflows. The BEP should be tailored and as comprehensive as required by the project.

A BEP defines model authoring/updating responsibilities, model sharing and integration protocols.

### AE Responsibility

Consult with GSA PM, design-side partners and build-side partners (if available) to outline design-side BEP.

### GC Responsibility

Consult with the GSA PM and AE to outline build-side BEP.

## BIM Standards

Projects must comply with the BIM Guidance outlined in the GSA BIM Guide Series and with the latest Region 5 BIM Standards posted on the Region 5 BIM Standards site at the time of contract signing.

### AE Responsibility

Comply with listed standards. Consult with the GSA PM and build-side partners (if available) to adopt additional standards that will improve project workflows.

### GC Responsibility

Upon receipt from the AE of design models confirm that applicable BIM standards have been adhered to. Notify the GSA PM of discrepancies.

### GSA Region 5 BIM Standards

Both AE and GC are required to follow all GSA Region 5 BIM Standards as found on the GSA Region 5 BIM Standards site at contract signing. These include but are not limited to;

* GSA National BIM Guides
  + <http://gsa.gov/bim>
* GSA Region 5 BIM Standards
  + <https://sites.google.com/a/gsa.gov/gsa-region-5-bim-standards/>

### Templates

There are several nationally recognized BIM authoring software packages. The most common packages are Bentley’s Building V8i series, Autodesk’s Revit series, and Graphisoft’s ArchiCAD. Within GSA’s Region 5 the most used BIM authoring tools by AEs are Autodesk’s Revit Architecture, Revit Structure, and Revit MEP. To accommodate for these tools, several templates for development of subsystem models for Architectural, Structural, Mechanical, and Electrical disciplines are found on the GSA Region 5 BIM Standards Site. Templates embed several Region 5 BIM Standards and GSA BIM Guide Series standards and must be used unless the GSA Project Manager has agreed to otherwise. Templates shall be used by the AE for all Region 5 projects unless otherwise authorized, in advance, by the GSA PM. Suggestions for improvements are welcomed.

# BIM Level of Detail (LOD): Minimum Requirements

The AE will provide to the GC and other team members a BIM of the subsystem models and intelligent element attributes that meets or exceeds the LOD requirements as defined within the Model Progression Matrix (MPM) and is adequate to complete the task in the Approved Use Guide.

The project LOD must be as required to meet the project goals and should provide as a minimum discipline subsystem models developed at similar LODs to facilitate interdisciplinary coordination and interference resolution to minimize RFI’s and field change orders; produce model generated coordinated drawings and increase certainty and reduce risk in the project’s workflow.

The LOD shall progress through the five levels in such a way as to be synchronized with the project stages/phases listed in the AE Scope of Work and as codified in the BEP’s MPM. This may include the need to model objects in a non-optimum order to meet the broader goals of the project.

## Summary of LOD Responsibility

LOD responsibility is to be defined element by element within the Model Progression Matrix but can be loosely defined as:

### AE Responsibility

* Concept/Analysis (LOD 100)
* Major Systems (LOD 200)
* Detailed Design (LOD 300)
* Record Drawings (LOD 500)

### GC Responsibility

* Install Level (LOD 400)
* As-Built Conditions (LOD 500)

# BIM Workflows

Outlined below are the minimum responsibilities for subsystem development and data hand-offs:

## Architectural

### AE Responsibility

Provide an architectural BIM with architectural elements that embody proper element information that adheres to the GSA Region 5 BIM Standards. Many BIM authoring applications have their own default objects, and these should be used whenever the defaults exist. Coordinate with the GSA project team and applicable contractors necessary to determine any additional objects that will be included in the model, such as toilet room elements, additional levels of detail, etc.

### GC Responsibility

The Contractor will review the architectural model provided by the AE and inform GSA immediately of any violations of standards that will impede the continued use of the BIM. The architectural BIM will include architectural objects that embody proper element information. In other words, whenever a tool is available in the BIM-authoring application to create the correct object type, it will have been used.

## Space Analysis

### AE Responsibility

Spatial elements within design must provide spatial attributes in accordance with GSA Space Assignment Policy Submit the project spatial data summary to the regional Spatial Data Manager (SDM) during Design Development phase (30%, 60%, 90%, 95%)

### GC Responsibility

Finalize deliverables in accordance with the BIM Guide Series 02 - Spatial Program Validation and support GSA in conducting spatial program analysis. Provide Spatial elements within the “As-built” model that are in accordance with BIM Guide Series 02 – Spatial Program Validation. Any adjustments to the “As-built” model will be completed by GC with guidance from the AE. Review the example SDM BIM posted at the Region 5 BIM Standards site.

## Zone Analysis

### AE Responsibility

Include 3D geometry or BIM objects (in addition to the requirements established in above) such that the model(s) is compatible with a computer-based analysis of zones (e.g., circulation, preservation, security, etc.). The AE will have built upon the components found in the GSA BIM Guides and as clarified under the CFC BIM standards.

## Structural

### AE Responsibility

Provide a structural BIM with the proper use of structural objects that embody object information that adheres to the GSA Region 5 BIM Standards. At a minimum structural members (i.e. foundations, columns, beams, slabs, etc) and their profiles and dimensions, structural member components (such as connection details for structural steel members, steel studs in composite steel, concrete reinforcement, etc.) and their profiles and dimensions. Miscellaneous steel members (such as steel kickers, hangers, lintels, struts, etc.) and their profiles and dimensions should be coordinated with the GSA project team and applicable contractors to determine the level of inclusion of these objects in the model. All structural BIM models should be compatible with computer based structural analysis programs. Coordinate with the GSA project team and applicable contractors necessary to determine any additional objects that will be included in the model

### GC Responsibility

Review the structural model provided by the AE and inform GSA immediately of any violations of standards that will impede the continued use of the BIM. . The structural BIM will include existing conditions and any new structural elements with the proper use of “structural objects” that embody “object information” about structural member profiles, members, and dimensions. Following this review, the AE must coordinate and seek approval from the GSA project team, regarding the contents of the model.

## Mechanical

### AE Responsibility

Provide a mechanical BIM model that embodies object information (including physical properties and internal specifications) thermal properties, pressure ratings, equipment capacities) that adheres to the GSA Region 5 BIM Standards. At a minimum HVAC equipment, ductwork, piping, and mechanical vertical transportation. Coordinate with the GSA project team and applicable contractors necessary to determine any additional objects that will be included in the model

### GC Responsibility

Review the HVAC model provided by the AE and inform GSA immediately of any violations of standards that will impede the continued use of the BIM. This HVAC BIM will embody “object information” (e.g., manufacturer system properties, duct class, maximum loads) about ductwork, HVAC equipment, piping, elevators, insulation, etc. The Mechanical BIM will have been built to incorporate all mechanical elements necessary to achieve BIM related project goals. Following this review, the AE will coordinate and seek approval from the GSA project team regarding the contents of the model.

## Electrical

### AE Responsibility

Provide an electrical BIM that embodies object information (e.g., loads, sizing) and that adheres to the GSA Region 5 BIM Standards. At a minimum conduit systems over, panel boards, electrical equipment, etc. The contractor(s) will coordinate with the GSA project team and applicable contractors necessary to determine any additional objects that will be included in the model.

### GC Responsibility

Review the electrical model provided by the AE and inform GSA immediately of any violations of standards that will impede the continued use of the BIM. This electrical BIM will embody “object information”(e.g., loads, sizing) about conduit systems, panel boards, electrical equipment, and all other elements necessary to achieve BIM related project goals. Following this review, the AE will coordinate and seek approval from the GSA project team regarding the contents of the model.

## Plumbing

### AE Responsibility

Provide a plumbing BIM that embodies object information (e.g., pressure, sizing) about plumbing fixtures and equipment and that adheres to the GSA Region 5 BIM Standards. At a minimum piping systems, etc. The contractor(s) will coordinate with the GSA project team and applicable contractors necessary to determine any additional objects that will be included in the model.

### GC Responsibility

Review the plumbing model provided by the AE and inform GSA immediately of any violations of standards that will impede the continued use of the BIM. This plumbing BIM will embody object information (e.g., pressure, sizing, manufacturer data, etc…) about plumbing fixtures, equipment, piping, and all other elements necessary to achieve BIM related project goals. Following this review, the AE will coordinate and seek approval from the GSA project team regarding the contents of the model.

# BIM Enabled Analyses

*Insert requirements for additional BIM based analyses or options SOW\_BIM\_Options~.docx include suggested text for:*

A.1 BIM Data Reuse

A.2 3D Geometric Model (Design Alternatives)

D.1 Art in Architecture

D.2 Geometry Based Zone Analysis

D.3 Daylight Model

D.4 Interior Design.

D.5 Project Phasing

D.6 Tenant Relocation

D.8 Structural Member Strengths

D.9: Site / Campus Analysis

D.10 Energy Modeling

D.11 CFD Analysis Compatibility

D.20 Virtual Acoustics Test for Courtrooms

D.21 Virtual Lighting/Interior Finishes Test for Courtrooms:

C.1 Quantity Take Off

C.2 Cost Estimating

C.3: Construction Sequencing

FM.1 Building Operations

FM.2 Facility Management

*Download from the Region 5 BIM Website and edit to suit project needs. Delete all guidance text highlighted in yellow.*

# Deliverables

Both AE and GC are obligated to provide to the GSA, at conclusion of the project, parametric and analyses models free of scratch or extraneous files that adhere to the Region 5 BIM Standards on deliverables.

Every time data is formally submitted to GSA it must include a Quality Report prepared by the submitting firm. There is no exception and data submitted without this report will not be accepted. Details and instructions for what is included within this report can be found on the Region 5 BIM Standards site.

### AE Responsibility

Record BIMs: Verify that all Construction BIMs (building, structure and building systems) represent as-built conditions, including Architectural Supplemental Instructions, Change Notices, and field changes and include the minimum attributes required by the GSA National Standards and Region 5 BIM Standards.

AE Record BIM is to be consistent with the construction BIM data. This should be achieved by the AE maintaining the Record BIM throughout the construction phase. Record BIMs must cover all areas in which work was performed and adhere to all applicable Region 5 BIM Standards.

BIMs are to be delivered in standards compliant;

* Native BIM Authoring Platform (e.g. RVT file)
* Record drawing version of the master coordination file in Navisworks NWF/NWC format.
* Published, non-protected, Navisworks NWD file
* IFC file per BIM
* COBie files as required to meet FM requirements of scope

### GC Responsibility

As-built BIMs: As-built BIMs must cover all areas in which work was performed and adhere to all applicable GSA National and Region 5 BIM Standards.

BIMs are to be delivered in standards compliant;

* Native BIM Authoring Platform (e.g. RVT file)
* Record drawing version of the master coordination file in Navisworks NWF/NWC format.
* Published, non-protected, Navisworks NWD file
* IFC file per BIM
* COBie files as required to meet FM requirements of scope

## Electronic/Print Media

### CAD Standards

**AE:** Starting with the design development submission any 2D drawing materials between parties on the project (including formal submittals to GSA) will be in accordance with the GSA PBS computer aided design (CAD) standards as well as the GSA Region 5 CAD standards. All BIM data exchanged between parties on the project will adhere to GSA Region 5 BIM Standards.

**GC:** Any 2D drawing materials between parties on the project (including formal submittals to GSA) will be in accordance with the GSA PBS computer aided design (CAD) standards as well as the GSA Region 5 CAD standards. All BIM data exchanged between parties on the project will adhere to GSA Region 5 BIM Standards.

### BIM Media

As most BIM application are not backwards compatible it is the responsibility of the BIM creator to ensure that GSA is able to read their data and that BIM data never be upgraded to a newer version without specific direction of GSA. BIM deliverables must supplement, and not replace, the GSA PBS CAD standards and deliverables. For specific requirements refer to the PBS CAD Standards and the Region 5 Supplemental (2D) CAD Standards.

Bidders should assume that every type of BIM data submitted to GSA will need to be submitted in both a native application format as well as a vendor neutral format. This may require that data be translated. This includes but is not limited to; simulation models, visualizations, coordination models and 4D schedule models.