ADDENDUM #1

Building Information Modeling (BIM) Guidelines  V 1.6 (April 18, 2012)

FOR DELIVERY METHOD:

NEGOTIATED GUARANTEED MAXIMUM PRICE (GMP) Contract for Construction with Preconstruction Services

USC Capital Construction Development and Facilities Management Services
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Architects - Initial _______

General Contractor - Initial _______

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APPENDIX I: JOINT BIM EXECUTION PLAN TEMPLATE
The following are additions and/or changes from Vs. 1.6 of the BIM Guidelines to be adopted for Negotiated Contracts. *All text in italic is an addition or revision*, non-italicized text is reprinted verbatim from the original guidelines.

1. Introduction

1.1 STATEMENT OF PURPOSE

This document describes USC’s requirements for the production and use of Building Information Models (BIM) in the design, construction and maintenance of its facilities for negotiated contracts (GMAX, GMP) with early contractor involvement.

If used effectively BIM provides opportunities to vastly improve upon traditional methods of design and construction coordination thereby reducing the potential for costly change orders, providing multiple opportunities for Owner review and participation by means of 3D visualization of the project and specialty spaces, and reducing design and construction schedules. In addition, BIM creates opportunities for reusing data for multiple purposes, including the operation and maintenance of USC’s facilities. To achieve these ends as effectively as possible, the BIM and associated data must be structured and organized to achieve the required purposes. In addition, the negotiated form of contract for which these guidelines have been developed encourages the adoption of many of the principles of Integrated Project Delivery, namely:

- That all project participants understand the value of collaboration and are committed to working as a team in the best interests of the project.
- The key participants are involved from the earliest practical moment.
- Project goals are developed early, agreed upon and respected by all participants.
- Team performance is based on open, direct and honest communication among all participants.
- Responsibilities are clearly defined in a no-blame culture leading to identification and resolution of problems, not determination of liability.

2. USC Responsibilities

**USC BIM CONSULTANT**

The primary role of USC’s BIM Consultant is to monitor the BIM processes implemented by the Design and Construction Teams and insure that these BIM Guidelines are adhered to throughout design, construction, close-out and commissioning, and for the benefit of facilities management. The actual scope of work performed by USC’s BIM Consultant will vary from project to project depending on the BIM experience and proficiency of that project’s Design and Construction Teams. USC’s BIM Consultant has the following responsibilities:

a. USC BIM Guidelines. Provide oversight of the project Design and Construction Teams to ensure that the requirements of the USC BIM Guidelines are properly and adequately addressed and delivered.

b. Coordination. Provide oversight of the A/E Team to ensure that 3D design coordination is completed, including model assembly in Navisworks, clash detection for all major trades’ modeled, visual inspections, and reporting.

c. Provide BIM facilitation and oversight during the design and construction phases with all Project Team members, including design and engineering consultants, the General Contractor and his subcontractors, and participating USC Project Team members from Facilities Management Services, Information Technology Services, Capital Construction Development, and Real Estate and Asset Management.
d. Provide model mash-ups (overlays) and coordination between as-built fabrication models (in native trade software) and the as-constructed design model in Revit, and guide and oversee the process to adjust the design model to as-built conditions.

e. Interface between the Architect and Engineering Design Team, the General Contracting Team, and USC, to ensure that the model content conforms to the University’s data and other requirements as outlined in the BIM Guidelines.

f. Attend and chair project BIM coordination meetings and produce meeting minutes, BIM clash detection and clash resolution reports.

g. Provide an overall schedule for the BIM coordination meetings and process.

h. Ensure that all project design and construction models and related documents are posted as required by schedule on the USC’s e-Builder website for this project, and confirm the use of e-Builder for other project communication, schedule, and other capabilities.

i. Provide regular detailed design BIM review during the development of the BIM model prior to handover to the general contractor. This review includes clash detection, visual examination of the combined architecture, structural and MEPF models. Provide a list of viewpoints in Navisworks of the issues found.

j. Do regular model content checks to verify that the scheduled and extended data contained in the model meets the BIM Guidelines specifications and is fully COBie compliant.

k. Conduct two BIM kickoff meetings: one for the Design and Engineering Team; and a second for the entire Project Team once a general contractor has been selected. The purpose will be to review the entire BIM process as required by the USC Guidelines and the general contractor’s own BIM process.

l. Conduct meetings as necessary to facilitate the hand-over of the design BIM model to the general contractor.

m. Provide oversight in the development of the final as-built model that is to be delivered to the university at the end of the project.

n. Review, evaluate, and comment on the BIM Execution Plans (BEP) provided by both the Design Team and the General Contractor which shall be posted by each team on e-Builder, and where a comment review form is available. Your comments shall evaluate how the BEP conforms to the BIM Guidelines.

3. Deliverables

3.1 DESIGN AND JOINT BIM EXECUTION PLANS (replaces 3.1 in its entirety)

3.1.1 Design BIM Execution Plan (BEP)

As part of their respective proposals/bid submittals, the Design Team shall submit a BIM Execution Plan (BEP) describing processes and procedures in place within their organization used to coordinate and deliver the BIMs and associated data according to the guidelines contained herein. The BEP should also include expected roles and responsibilities of the General Contractor even if that party has not yet been identified. The Design Team shall use the JOINT BIM Execution Plan template provided in Appendix I which shall include the submission of a completed Minimum Modeling Matrix (M3). Refer to section 5.1.2.

3.1.2 Architect, Engineer, Contractor (AEC) Team Joint BIM Execution Plan

Upon Notice to Proceed to the Contractor, the AEC Team shall submit a Joint BIM Execution Plan (JBEP) that incorporates relevant Design Team BEP components and which results from a collaborative effort between the Construction Team, the AE team, USC’s BIM Facilitator and USC’s Project Manager. At least two face to face work sessions should be scheduled with all team members contributing and agreeing to the contents of the JBEP. Throughout this document reference is made to specific details that must be covered in the JBEP. A Joint BIM Execution Plan template is provided in Appendix I. The joint Design/Construction Team shall use the JOINT BIM Execution Plan template provided in Appendix I which shall include the submission of an updated Minimum
Modeling Matrix (M3). Although the M3 only displays levels of development 100 through 300, level 400 may be inserted as appropriate. Refer to section 5.1.2.

3.1.3 Joint BIM Execution Plan Review and Approval

The process for review and approval of the Design Team BEP and the subsequent JBEP is as follows:

a. Delivery of JBEP to USC:
   Submit the JBEP within 2 weeks of the successful AE Team’s or Contractor’s authorization to proceed or on an agreed upon date with USC’s Project Manager for the project.

b. USC review and resubmit:
   USC will evaluate the JBEP and provide feedback within 2 weeks, after which the team will have 2 weeks to make the requested revisions to the JBEP and resubmit.

c. Signed by all parties:
   The final JBEP must be validated and signed by all parties to the AE(C) Team, including any consultants who are affected by its contents and who have been involved in its development.

d. Changes:
   Any changes in the team, or changes to the execution plan, must be agreed upon by all parties, approved by USC, and submitted as a revised Joint BIM Execution Plan.

4. Design Team BIM Process and Modeling Requirements

4.4 DESIGN BIM FACILITATOR

b. Ensuring that the BIM’s get uploaded to e-Builder on time, in the correct file formats and are correctly named.

c. Ensuring that the submitted BIM’s comply with all of the requirements as defined in the BIM Guidelines, including COBIE and scheduled data requirements.

e. Providing design coordination and leading the issue resolution process with a well coordinated set of design BIMs as the end goal.

5. MEPF Specifications

5.1 SHARED PARAMETERS AND ASSOCIATED DOCUMENTS

The following documents may be found on the USC FMS website

5.1.1 Required Parameters and Nomenclature

http://www.usc.edu/fms/technical/cad/BIMGuidelines.shtml

USC Revit Parameters List
A list of Autodesk® Revit specific parameters to use, where to populate them in Autodesk® Revit, who supplies each piece of information and relevant examples condensed into a spreadsheet.

USC Shared Parameters File for Autodesk® Revit
This Revit formatted shared parameter file follows the content of the USC Revit Parameter List spreadsheet and is provided to help populate Revit files with USC required parameters and/or with the creation of Revit families. This file may be used to supplement an existing shared parameter file.
5.1.2 Minimum Modeling Matrix and JBEP

The following documents may be found in the document folder 10.1 on e-Builder:

Minimum Modeling Matrix (M3)* provides modeling requirements in a straightforward matrix format. See section K of Appendix I.

Joint BIM Execution Plan as shown in Appendix I.

USC Clash/Issue Matrix as described and illustrated on pages 10 and 11.

*The M3 was developed by the United States Army Core of Engineers (USACE) to provide modeling requirements in a straightforward matrix format.

5.2 NOMENCLATURE

The following documents may be found on the USC FMS website:

USC Revit Nomenclature
(USC BIM Guidelines version 1.6 Appendix C)
USC Revit Naming Requirements for Autodesk® Revit Families, Types and Instances

USC Revit Nomenclature Guide
This guide in form of a PowerPoint presentation serves a visual introduction in assisting with the naming of equipment families, types, instances, systems and zones in Autodesk® Revit.

6. Design Phases

6.3 DESIGN DEVELOPMENT PHASE

6.3.1 General

If the Construction Team is engaged during this phase, they shall attend the design BIM Coordination meetings in a design assist role. All of the design models will be uploaded bi-weekly, or as agreed to in the JBEP, and be accessible to the Construction Team via e-Builder in order to provide input on constructability, scheduling and estimating and assist in the BIM coordination and conflict resolution process.

The JBEP must detail the processes in place by which there will be a continuous flow of communication, design input and support between all parties. Additionally, the JBEP shall describe when and at what intervals the trade subcontractors will begin attending design BIM coordination meetings as well as their expected model content, if applicable.

6.3.2 Model Content

If the Construction Team is engaged during this phase, they shall begin modeling as soon as it is responsibly appropriate to do so and their models shall be incorporated into the design coordination process.

- Fire Sprinklers
- Framing
- Specialty contractors

Any other modeling of MEP systems is up to the discretion of the Construction Team based on their assessment of the utility of commencing such work at a given time. Particularly challenging coordination areas may benefit from quick “throw away” trade models to assist the Design Team in arriving at a more timely resolution. The Construction Team shall detail their proposed design assist processes in the JBEP.

The Minimum Modeling Matrix (M3) referred to in the JBEP will provide the proposed LOD for each model element.
6.4 CONSTRUCTION DOCUMENTS PHASE

6.4.1 General

If the Construction Team is engaged during this phase, they shall attend the design BIM Coordination meetings in a design assist role. All of the design models will continue to be uploaded bi-weekly or weekly and be accessible to the Construction Team via e-Builder in order to provide input on constructability, scheduling and estimating and assist in the BIM coordination and conflict resolution process.

All scheduled information (equipment schedules, door schedules, etc.) must be derived from the models and the scheduled data must adhere to the Nomenclature rules defined in Appendix C.

The JBEP should list those elements in the models for which scheduled data will be provided as well as any exceptions thereof.

6.4.2 Model Content

If they have not done so already, the following trade subcontractors should begin modeling their respective trades:

- Fire Sprinklers
- Framing
- Specialty contractors

Any other modeling of MEP systems is up to the discretion of the Construction Team based on their assessment of the utility of commencing such work at a given time. Particularly challenging coordination areas may benefit from quick “throw away” trade models to assist the Design Team in arriving at a more timely resolution. The Construction Team shall detail their proposed design assist processes and proposed timing of trade modeling in the JBEP.

6.5.3 BIM EXECUTION PLAN

Delete this section from V1.6 and refer to section 3.1.2 above.

7. Construction Team BIM Process and Modeling Requirements

7.1 BIM EXECUTION PLAN FEEDBACK AND REVISIONS

Delete this section from V1.6 and replace with section 3.1.3 above.

7.2 CONSTRUCTION BIM FACILITATOR

The General Contractor must have a dedicated full time BIM facilitator/BIM engineer on staff with at least 3 years of proven MEPF coordination experience and whose responsibilities include, but are not limited to:

- Ensuring that the BIM’s get uploaded to e-Builder on time and in the correct file format(s).
- Assembling the submitted design and construction BIM’s into a single consolidated BIM in Navisworks and reviewing the consolidated BIM for coordination and constructability issues.
- Leading the coordination and constructability resolution process.
- Creating and providing a clash/issue matrix to track coordination issues.
APPENDIX F: COLLISION DETECTION AND DESIGN REVIEW

Replaces V1.6 Appendix F in its entirety.

The designated BIM Facilitator shall assemble all of the design models into a single consolidated model and use automated collision detection software for this phase of the work. In addition, a visual walkthrough of the model from various perspectives and cross sections shall be performed to detect any constructability issues that would not necessarily be detected automatically. For a multi-level building, the consolidated model shall be reviewed, and corresponding clashes identified, on a floor by floor basis. The proposed process for tracking and resolving design/constructability issues must be described in detail in the JBEP.

Priorities for the Collision/Issue resolution process:

1. **Priority One Collisions/Issues**
   
   Priority One Collisions/Issues are reported collisions that are considered critical to the design and construction process. These collisions have been assigned the highest priority and should be rectified within the model as soon as possible:
   
   - Mechanical Ductwork and Piping vs. Ceilings
   - Mechanical Ductwork and Piping vs. Rated Walls (for coordination of dampers and other mechanical equipment needs)
   - Mechanical Ductwork and Piping vs. Structure (Columns, Beams, Framing, etc.)
   - All Equipment and their applicable Clearances vs. Walls
   - All Equipment and their applicable Clearances vs. Structure
   - Mechanical Equipment and Fixtures vs. Electrical Equipment and Fixtures
   - Mechanical Ductwork and Piping vs. Plumbing Piping

2. **Priority Two Collisions/Issues**
   
   Priority Two Collisions/Issues are reported collisions that are considered important to the design and construction process. These collisions have been assigned a greater priority and should be rectified during project meetings during design:
   
   - Casework vs. Electrical Fixtures and Devices
   - Furnishings vs. Electrical Fixtures and Devices
   - Structure (Columns, Beams, Framing, etc.) vs. Specialty Equipment
   - Structure (Columns, Beams, Framing, etc.) vs. Electrical Equipment, Fixtures and Devices
   - Ductwork and Piping vs. Electrical Equipment, Fixtures, and Devices
   - Ductwork vs. Floors

3. **Level Three Collisions/Issues**
   
   Priority Three Collisions/Issues are reported collisions that while considered important to the correctness of the model will generally be changing on a regular basis throughout the design and construction process. These collisions have been assigned a lower level of priority and should be rectified before the phase submission of the models:
   
   - Casework vs. Walls
   - Plumbing Piping vs. Electrical Equipment, Fixtures, and Devices
   - Plumbing Piping vs. Mechanical Equipment, Fixtures, and Devices
   - ADA Clear Space Requirements vs. Doors, Fixtures, Walls, Structure

4. **All other Collisions/Issues**
   
   While the above collisions/issues have been assigned priorities other collisions will exist within the models. The collisions are not all ignorable nor should they be discarded. Some collisions will exist because the software available is not yet mature enough to support the modeling efforts. The intention should be to have a model that

Architects - Initial _______

General Contractor - Initial _______

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is as error and collision free as possible at each submission phase with documented proof that the Design Team tracked and addressed the prior collisions above.

Collisions and issues shall be tracked at a minimum by generating numbered viewpoints in a collision detection software such as Autodesk Navisworks, and placing them in a dated folder. Sharing this collision checked file with other Design Team members allows individuals to review issues that pertain to them in a systematic way. This should be done by the BIM Facilitator (BIMF) using the following iterative process:

1. All team members post their discipline specific models such as a Navisworks NWC or NWD file.
2. MEP models should be saved out as separate models (HVAC, Mechanical Pipe, Fire Sprinkler, Plumbing, Electrical, Lights, Cable Tray)
3. The BIMF assembles the models, runs clash detection and performs a visual inspection.
4. The BIMF saves numbered and named viewpoints and creates a Clash Matrix that allows for the prioritization of issues such as an excel spreadsheet. (See example below)
5. The BIMF posts the Navisworks Clash/issue file and the Clash Matrix on e-Builder.
6. A Coordination meeting is held to review issues.
7. The BIMF re-posts the Navisworks Clash/issue file and the Clash Matrix on e-Builder with any new views or information generated during the coordination meeting.
8. The Design/Construction Team resolves as many issues as possible, fills in the Clash Matrix, and posts the models and completed Matrix prior to the next coordination meeting.
9. The BIMF compiles all Clash Matrices, re-assembles the models and re-clashes and inspects visually.
10. The BIMF saves numbered and named viewpoints and updates the Clash Matrix with new issues and moving resolved issues into a “resolved” folder.
11. The BIMF posts the Navisworks Clash/issue file and the Clash Matrix on e-Builder.
12. Coordination meeting to review non-resolved and new issues and to confirm resolved items.
13. Move agreed upon “non-issues” into an “Approved as is” folder.
14. Repeat items 7 to 13 until an agreed upon level of coordination is reached.

BIM Coordination process overview

A Clash/Issue Matrix should be created, distributed at each coordination meeting, updated and maintained for the project duration.

Architects - Initial _______
General Contractor - Initial _______
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Sample Clash Matrix. The editable Excel file may be found on the USC FMS website.
http://www.usc.edu/fms/technical/cad/BIMGuidelines.shtml

Architects - Initial _______

General Contractor - Initial _______

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APPENDIX I

Replaces V1.6 Appendix I in its entirety.

JOINT BUILDING INFORMATION MODELING (BIM) EXECUTION PLAN

FOR

[PROJECT TITLE]

DEVELOPED BY

[AUTHOR COMPAN(IES)]

DATE:

(DATE EXECUTED)

Note: This template is a tool that is provided to assist in the development of a USC BIM Project Execution Plan as required per contract. It was adapted from the United States Army Core of Engineers (USACE) BIM Project Execution Plan Template (PxP) Version 2.0., dated 9-13-2012.
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NOTE: All text that is grey is for illustrative purposes only and should not be construed as a formalized response to this execution plan.
SECTION A: PROJECT INFORMATION

This Joint BIM Project Execution Plan defines uses for BIM on the project along with a detailed description of the process for executing BIM throughout the project lifecycle.

[INSERT ADDITIONAL INFORMATION HERE IF APPLICABLE]. Additional detailed information can be included as an attachment to this document

This section defines basic project reference information and determined project milestones.

1. FACILITY OWNER:

2. PROJECT NAME:

3. PROJECT LOCATION:

4. CONTRACT TYPE/DELIVERY METHOD:

5. FACILITY TYPE:

6. BRIEF PROJECT DESCRIPTION:

7. ADDITIONAL PROJECT INFORMATION: [UNIQUE BIM PROJECT CHARACTERISTICS AND REQUIREMENTS]

8. PROJECT INFORMATION (PROVIDED BY USC)

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## SECTION B: KEY PROJECT CONTACTS

List of lead BIM contacts for each organization on the project. Additional contacts can be included later in the document.

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<th>NAME</th>
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## SECTION C: BIM USES

The BIM Uses currently highlighted/shaded and checked with an (X) are required by USC. The Contractor is to identify with a (C) additional BIM Uses selected as Contractor Electives for the project. The Design Team is to identify with a (DT) additional BIM Uses selected as Design Team Electives for the project. Include additional BIM Uses as applicable in empty cells of Design and Construct columns. Do not complete Plan and Operate Columns.

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<td></td>
<td>(4D)</td>
<td>(4D)</td>
</tr>
<tr>
<td>COST ESTIMATION</td>
<td></td>
<td>CONSTRUCTION SCHEDULING</td>
<td>COST ESTIMATION</td>
</tr>
<tr>
<td>(5D)</td>
<td></td>
<td>(4D)</td>
<td>(5D)</td>
</tr>
<tr>
<td>EXISTING CONDITIONS MODELING</td>
<td></td>
<td>COST ESTIMATION (5D)</td>
<td>COST ESTIMATION (5D)</td>
</tr>
<tr>
<td>CONSTRUCTION OPERATIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUILDING INFORMATION</td>
<td>X CONSTRUCTION OPERATIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCHANGE (COBie)</td>
<td>CONSTRUCTION OPERATIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUILDING INFORMATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EXCHANGE (COBie)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X CONSTRUCTION OPERATIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUILDING INFORMATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EXCHANGE (COBie)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Architects - Initial _______

General Contractor - Initial _______

October 12, 2012 Addendum #1 –Joint BIM Execution Plan
SECTION D: ORGANIZATIONAL ROLES / STAFFING

For each BIM use required and contractor selected, identify the team within the organization (or organizations) who will staff and perform that use. Staff members may fill multiple project roles.

### DESIGN PHASE BIM USE

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>LOCATION(S)</th>
<th>LEAD CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN AUTHORING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROGRESS REVIEWS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DESIGN 3D COORDINATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBie Data Collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCHITECTURAL SCHEDULED DATA ENTRY (REVIT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEP SCHEDULED DATA ENTRY (REVIT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CONSTRUCTION PHASE BIM USE

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>LOCATION(S)</th>
<th>LEAD CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTRUCTION 3D COORDINATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD MODELING – ADD ROWS FOR DIFFERENT MODEL TYPES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD DATA ENTRY – ADD ROWS FOR DIFFERENT DATA TYPES</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

List enhancements from minimum BIM uses as selected in section C. Note: enhancements must exceed minimum contract requirements BIM uses. (i.e. performing structural analyses on specific areas versus whole facility, performing cost / quantity take-off on specific floors versus whole facility, etc.)

### SELECTED BIM USE ENHANCEMENT

<table>
<thead>
<tr>
<th>DESCRIPTION / ADDED VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Architects - Initial _______

General Contractor - Initial _______

October 12, 2012 Addendum #1 – Joint BIM Execution Plan
SECTION E: BIM PROCESS DESIGN

Provide an Overview Process Map for all BIM Uses (Level 1). Provide Detailed Process Maps for each REQUIRED (marked with X), Contractor-Elected (marked with C) and Design Team Elected (marked with a DT) BIM Use in Section C (Level 2). Sample Process Maps may be downloaded from www.engr.psu.edu/BIM/PxP for your use but you may use your own templates if preferred. (Please note that these are sample maps and should be modified based on project specific information and requirements and contractor internal procedures and processes).
SECTION F: BIM PROCESSES AND COLLABORATION PROCEDURES

1. COLLABORATION STRATEGIES
Describe the collaboration strategies and detailed processes used for developing, coordinating and leveraging the BIMs for the following purposes (as applicable).

Describe how the Project Team will collaborate in the development and execution of modeling and data collection for the project.

Include items such as electronic communication requirements and procedures, document management, transfer, and updating, and record storage. List the Project Team participants required for each:

- a. Existing conditions – determining control points, how the data is collected (laser scanning, or other)
- b. Design reviews
- c. Design coordination
- d. Design assist
- e. Construction coordination
- f. Design model updates during construction
- g. Engagement of USC departments
- h. Record modeling
- i. Record data collection (COBie and other)
- j. Energy analysis
- k. Estimating
- l. Scheduling
- m. Other (describe)

2. COLLABORATION ACTIVITIES
The following are examples of activities that should be considered.

<table>
<thead>
<tr>
<th>ACTIVITY TYPE</th>
<th>REQUIRED</th>
<th>PROJECT STAGE</th>
<th>FREQUENCY</th>
<th>PARTICIPANTS</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIM REQUIREMENTS KICK-OFF</td>
<td>YES</td>
<td>ONCE</td>
<td>w/ USC PROJECT MANAGER</td>
<td>WEB MEETING OR AGREED LOCATION</td>
<td></td>
</tr>
<tr>
<td>BIM EXECUTION PLAN DEMONSTRATION</td>
<td>YES</td>
<td>ONCE</td>
<td>w/ USC PROJECT MANAGER</td>
<td>WEB MEETING OR AGREED LOCATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN COORDINATION</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ANY OTHER BIM ACTIVITY THAT OCCURS WITH MULTIPLE PARTIES]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. **MODEL DELIVERY SCHEDULE, APPLICATION AND FILE EXCHANGE TYPE**

Document the information exchanges and file transfers that will occur on the project.

<table>
<thead>
<tr>
<th>DISCIPLINE</th>
<th>BIM USE</th>
<th>ONE-TIME or FREQUENCY</th>
<th>DUE DATE or START DATE</th>
<th>MODEL FILE</th>
<th>MODEL SOFTWARE</th>
<th>NATIVE FILE TYPE</th>
<th>VERSION</th>
<th>FILE EXCHANGE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHITECTURE</td>
<td>DESIGN AUTHORING</td>
<td>WEEKLY</td>
<td>20__ - __ - __</td>
<td>ARCH</td>
<td>Revit</td>
<td>.RVT</td>
<td>.RVT</td>
<td>.RVT .DWG .NWC</td>
</tr>
<tr>
<td>ARCHITECTURE</td>
<td>3D COORDINATION</td>
<td>WEEKLY</td>
<td>[DATE]</td>
<td>COORD</td>
<td>Navisworks</td>
<td>.NWD</td>
<td>.NWD</td>
<td>.NWD .XYZ .ABC</td>
</tr>
<tr>
<td>STRUCTURE</td>
<td>WEEKLY</td>
<td>[DATE]</td>
<td>[DATE]</td>
<td>STRUCT</td>
<td>DESIGN APP</td>
<td>.XYZ</td>
<td>.XYZ</td>
<td>.XYZ .ABC</td>
</tr>
<tr>
<td>MECHANICAL</td>
<td>WEEKLY</td>
<td>[DATE]</td>
<td>[DATE]</td>
<td>MECH</td>
<td>DESIGN APP</td>
<td>.XYZ</td>
<td>.XYZ</td>
<td>.XYZ .ABC</td>
</tr>
<tr>
<td>ETC...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## SECTION G: QUALITY CONTROL

1. **OVERALL STRATEGY FOR QUALITY CONTROL**
   Describe the strategy to control the quality of the model.

2. **QUALITY CONTROL CHECKS**
   The following checks should be performed to assure quality.

<table>
<thead>
<tr>
<th>CHECKS</th>
<th>DESCRIPTION</th>
<th>RESPONSIBLE PARTY</th>
<th>SOFTWARE PROGRAM(S)</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>VISUAL CHECK</td>
<td>Describe how to ensure there are no unintended model components and the design intent has been followed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTERFERENCE CHECK</td>
<td>Describe how you will conduct interference checking where two building components are clashing including soft and hard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STANDARDS CHECK</td>
<td>Describe how to ensure that the BIM Standards have been followed (levels/layers, colors, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODEL INTEGRITY CHECKS</td>
<td>Describe the QC validation process used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REVIT WARNING CHECKS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION H: TECHNOLOGICAL INFRASTRUCTURE NEEDS

1. SOFTWARE:
List software used to deliver BIM. Remove BIM Use and software that is not applicable. Describe procedure for changing the software version during project execution.

<table>
<thead>
<tr>
<th>BIM USE</th>
<th>USER</th>
<th>SOFTWARE</th>
<th>VERSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN AUTHORING</td>
<td>ARCHITECTURAL</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>STRUCTURAL</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>MECHANICAL</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>ELECTRICAL/TELECOM</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>PLUMBING</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>FIRE PROTECTION</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>CIVIL</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>DESIGN AUTHORING</td>
<td>INTERIOR</td>
<td>XYZ DESIGN APPLICATION</td>
<td></td>
</tr>
<tr>
<td>SCHEDULING (4D)</td>
<td></td>
<td>SCHEDULING (4D) MODELING SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>COST ESTIMATION (5D)</td>
<td></td>
<td>COST ESTIMATION (5D) SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>EXISTING CONDITIONS MODELING</td>
<td></td>
<td>EXISTING CONDITIONS MODELING SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>3D COORDINATION</td>
<td></td>
<td>3D COORDINATION SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>DESIGN REVIEWS</td>
<td></td>
<td>DESIGN REVIEWS SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>STRUCTURAL ANALYSIS</td>
<td></td>
<td>STRUCTURAL ANALYSIS SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>LIGHTING ANALYSIS</td>
<td></td>
<td>LIGHTING ANALYSIS SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>ENERGY ANALYSIS</td>
<td></td>
<td>ENERGY ANALYSIS SOFTWARE</td>
<td></td>
</tr>
<tr>
<td>CODE VALIDATION</td>
<td></td>
<td>CODE VALIDATION</td>
<td></td>
</tr>
<tr>
<td>PROGRAMMING</td>
<td></td>
<td>PROGRAMMING</td>
<td></td>
</tr>
<tr>
<td>SITE ANALYSIS</td>
<td></td>
<td>SITE ANALYSIS</td>
<td></td>
</tr>
</tbody>
</table>

COBie

Architects - Initial _______
General Contractor - Initial _______

October 12, 2012 Addendum #1 –Joint BIM Execution Plan
2. **INTERACTIVE WORKSPACE AND COMMUNICATION TECHNOLOGY**

The Project Team should consider the physical environment it will need throughout the lifecycle of the project to accommodate the necessary collaboration, communication, and reviews that will improve the BIM Plan decision making process. Describe how the Project Team will be located. Consider questions like “will the team be collocated?” If so, where is the location and what will be in that space? Will there be a BIM Trailer? If yes, where will it be located and what will be in the space such as computers, projectors, tables, table configuration. If not collocated, what communication technology (Webex, Gotomeeting, etc.) will be implemented?
SECTION I: MODEL ORGANIZATION

1. FILE NAMING STANDARD:
List examples of file names by discipline.

<table>
<thead>
<tr>
<th>FILE NAMES FOR MODELS SHOULD BE FORMATTED AS:</th>
<th>X2Y_50%CD _ LXX_DISCIPLINE _ ORGANIZATION _DATE (YEAR-MONTH-DAY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCHITECTURAL MODEL</td>
<td>X2Y_50%CD _ LXX_ARCH _ ZXY_????-??-??</td>
</tr>
<tr>
<td>CIVIL MODEL</td>
<td>X2Y_50%CD _ LXX_CIV _ ZXY_????-??-??</td>
</tr>
<tr>
<td>MECHANICAL (HVAC) MODEL*</td>
<td>X2Y_50%CD _ LXX_HVAC _ ZXY_????-??-??</td>
</tr>
<tr>
<td>MECHANICAL (PIPE) MODEL*</td>
<td>X2Y_50%CD _ LXX_MECH _ ZXY_????-??-??</td>
</tr>
<tr>
<td>PLUMBING MODEL*</td>
<td>X2Y_50%CD _ LXX_PLBG _ ZXY_????-??-??</td>
</tr>
<tr>
<td>FIRE SPRINKLER*</td>
<td>X2Y_50%CD _ LXX_FIRE _ ZXY_????-??-??</td>
</tr>
<tr>
<td>ELECTRICAL MODEL*</td>
<td>X2Y_50%CD _ LXX_ELEC _ ZXY_????-??-??</td>
</tr>
<tr>
<td>STRUCTURAL MODEL (STEEL)*</td>
<td>X2Y_50%CD _ LXX_STEEL _ ZXY_????-??-??</td>
</tr>
<tr>
<td>STRUCTURAL MODEL (CONCRETE)*</td>
<td>X2Y_50%CD _ LXX_CONC _ ZXY_????-??-??</td>
</tr>
<tr>
<td>STRUCTURAL MODEL (REBAR)</td>
<td>X2Y_50%CD _ LXX_REBAR _ ZXY_????-??-??</td>
</tr>
<tr>
<td>COORDINATION MODEL</td>
<td>X2Y_50%CD _ LXX_COORD _ ZXY_????-??-??</td>
</tr>
<tr>
<td>OTHER MODEL</td>
<td></td>
</tr>
</tbody>
</table>

*50%CD could be 100%CD or DD or SD, for example.
*CON during construction

For example: ANN_CON_L01_HVAC_GFC_2012-03-15
ANN_50%DD_ALL_ARCH_ABC_2012-03-15
In this case, the architectural model has not been split up by floor, hence “ALL”

2. MODEL STRUCTURE:
Describe and diagram how the Model will be divided up by each discipline and trade contractor. For example, by building, by floors, by zones, by areas.

3. MEASUREMENT AND COORDINATE SYSTEMS:
Describe the measurement system (Imperial or Metric) and coordinate system (geo-referenced) used.

4. MODEL ACCURACY AND TOLERANCES:

<table>
<thead>
<tr>
<th>PHASE</th>
<th>DISCIPLINE</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN DOCUMENTS</td>
<td>ARCH</td>
<td>ACCURATE TO +/- [ # ] OF ACTUAL SIZE AND LOCATION</td>
</tr>
<tr>
<td>SHOP DRAWINGS</td>
<td>MECH CONTRACTOR</td>
<td>ACCURATE TO +/- [ # ] OF ACTUAL SIZE AND LOCATION</td>
</tr>
</tbody>
</table>

Architects - Initial ______
General Contractor - Initial ______

October 12, 2012 Addendum #1 –Joint BIM Execution Plan
**SECTION J: PROJECT DELIVERABLES**

In this section, list the BIM deliverables for the project and the format in which the information will be delivered.

<table>
<thead>
<tr>
<th>BIM SUBMITTAL ITEM</th>
<th>STAGE/PROJECT MILESTONE</th>
<th>FORMAT</th>
<th>APPROXIMATE DUE DATE</th>
<th>RESPONSIBLE PARTY</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>QA/QC reports - Visual Check Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QA/QC reports - Interference Management Checks</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Interactive Review Format</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Autodesk Navisworks, Revit, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List of all submitted files (Excel spreadsheet preferred)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record Design Revit Models</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBie 2.4 Worksheets – Design Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“As-Built” Record Revit models. If there are more than one, list each model separately.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“As Built” Native format MEPF and structural models. List each model type (trade) separately.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COBie 2.4 Worksheets &amp; Documents - GC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[Other BIM Deliverables]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design BEP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint BEP</td>
<td></td>
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</tr>
</tbody>
</table>

Architects - Initial _______

General Contractor - Initial _______

October 12, 2012 Addendum #1 – Joint BIM Execution Plan
SECTION K: MINIMUM MODELING MATRIX (M3)

The USACE M3 Minimum Modeling Matrix, in spreadsheet format, is a tool that shall be used by the entire project team to document and communicate the scope of modeled content within the BIM deliverables, and help the project team organize the content by using common classification systems such as Omniclass, Uniformat and Masterformat. Additional instructions are provided in the M3.

The Minimum Modeling Matrix (M3) can be found on the USC FMS Website.
SECTION L: ATTACHMENTS

Either insert the relevant information pertaining to the following within the applicable section of this document, or attach all documentation in this section:

1. LEVEL 1 PROCESS OVERVIEW MAP [SECTION E]
2. LEVEL 2 DETAILED BIM USE PROCESS MAP(S) [SECTION E]
3. INFORMATION EXCHANGE REQUIREMENT WORKSHEET(S) – COBie [SECTION J]
4. MINIMUM MODELING MATRIX (M3) [SECTION K]
5. FILE NAMING STANDARD [SECTION I]
6. OTHER [AS APPLICABLE]
SECTION M: JOINT SIGNATURE PAGE

By signing this form, the signatory certifies that he/she will follow the processes described in this BIM Execution Plan and provide all of the USC deliverables as scheduled.

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Date____________________ By____________________________

Architects - Initial ______

General Contractor - Initial ______