BIM-M
Building Information Modeling for Masonry

Request for Proposal for Revit Modeling of Masonry

September 8, 2014

Invitation for Modeling Project

The Building Information Modeling for Masonry Initiative (BIM-M) invites Consultants (architects, engineers, contractors, BIM specialists, etc.) to submit a proposal for either or both Project 1 or Project 2. Each project involves the creation of models and details of masonry buildings using Autodesk Revit 2014. BIM-M expects to award either or both of Projects 1 and 2 with cost as a major consideration.

This modeling project will be included in an overall plan to develop a Masonry Best Practices Guide (Guide) for design professionals. The Consultants' work will include both creative modeling efforts and input into the Guide. BIM-M's goal is that the guide will provide instruction on how to use BIM with masonry to its greatest and best use for modeling today, and point the way towards improvements to the underlying software, so that evolving BIM software will become more capable of representing masonry design and construction.

The Guide is intended to provide the design profession with detailed instructions and small explanatory BIM models that demonstrate how to use Revit to create models that depict masonry in typically used scenarios. We recognize that Revit and other BIM authoring tools are not fully-developed for use with masonry, and often "work-arounds" are required for the BIM model to depict masonry properly in models, elevations and sections. In addition, we are aware that many design practices use BIM to represent masonry only at the most elemental level, and transmit the more detailed information about masonry construction in conventional 2-D drawings that are not generated through or tied to BIM. However, we expect that the Guide will contain directions to the profession as to these situations and to how the models might be applied.

It is tradition in design practice to submit design documents with increasing levels of detail at the schematic design, design development and contract document stages of the project. The BIM models at each of the stages might be expected to contain more detailed information at the later stages of the project. The contract deliverable BIM models for this project should be delivered according to a typical BIM execution plan so that the owner and contractors can have downstream uses of the BIM model during building procurement, construction planning, fabrication, installation and operational phases of the building. The terms "level of detail" and "level of development" or LOD are being used in BIM parlance to identify the use of the model and the rationale for including certain details. The Consultants will work with the Project Manager, Georgia Tech's Digital Building Laboratory, and the TMS BIM

Committee to illustrate BIM models suitable to different phases of a project. The Project Manager will also direct the review efforts of the TMS BIM Committee.

Project Responsibilities

The roles and responsibilities of each of the team member are provided here. The discussion is somewhat linear, following the initiation, clarification, contract award, modeling production, guide production, draft review and publication phases.

Team Members

The Guide team will consist of the following members: Consultants, the Georgia Tech Digital Building Laboratory (DBL), BIM-M Project Manager appointed by the BIM-M Executive Board, The Masonry Society (TMS) BIM Committee, and the BIM-M Program Coordinator.

Consultants

The Consultants selected must have experience with Autodesk Revit 2014 and must have modeled masonry projects in their practice. Providing masonry work-arounds is essential.

The Consultants will generate the BIM models, associated 2-D drawings, and narratives explaining how the models were generated. They will convey the text, models and 2-D drawings to the Project Manager and Georgia Tech as .doc, .rvt and 2-D .dwg files.

The use of student interns is discouraged unless under the direct supervision of senior staff. The Consultants' team must include architects, structural engineers, mechanical engineers, and energy analysts. Teams of firms are acceptable provided there is one overall firm and manager.

Georgia Tech Digital Building Laboratory

The Georgia Tech DBL will collect and organize the BIM models and other associated data. The DBL team, headed by Russell Gentry, will produce the original rough-draft of the Guide from the submissions. Because we expect that multiple Consultants may provide one or more models, the DBL will develop and maintain a matrix of models/details from all participants, showing which models are delivered and what masonry details are delivered in these models.

BIM-M Project Manager

The BIM-M Project Manager, Ms. Jamie Davis, PE, will supervise the project for the BIM-M initiative. Ms. Davis is also Chair of the TMS BIM Committee. As Project Manager, she is responsible for recommending contract awards, verifying the work is delivered on time and according to the contract, and overall project review and coordination.

The Masonry Society BIM Committee

The TMS BIM committee will provide overall project review. They will provide the introductory and concluding chapters to the Guide. It is anticipated that the TMS BIM committee will be the publisher of the Guide and that the BIM models and details will be distributed through the TMS website and the BIM-M website. The TMS BIM Committee will be in charge of maintaining and updating the document in future years.

BIM-M Program Coordinator

The BIM-M Program Coordinator, David Biggs, PE, SE, will provide general oversight for the project and be the liaison with the BIM-M Executive Committee.

Project Models

BIM-M prefers that models be taken from actual projects or new models will be developed that demonstrate all the features of Revit modeling requested. A combination of architectural, structural, and mechanical models may be needed. Existing projects should be sanitized of exact project identification. The intent is to highlight the masonry aspects of the models. Non-masonry information is not required unless it is necessary to highlight the interface with the masonry.

There are two possible projects. Consultants may submit proposals for either or both. If funding is unavailable for both projects, preference will be given to Project 1.

Project 1: Loadbearing Masonry Building

The Consultant is required to provide modeling for a load bearing building using one of the following building types.

- K-12 school or university building
- college dormitory
- mid-rise apartment building

The building must be a mixture of single- and multi-story.

Project 2: Multi-story, Framed Building

The Consultant is required to provide modeling for a multi-story, framed building using one of the following building types.

- school or university building
- office building
- hospital or medical facility

The exterior walls shall include a masonry veneer over CMU or cold-formed metal framing. Interior walls shall be single-wythe CMU.

Conditions

a. The information gathered is ultimately expected to be shown as a matrix. The matrix of BIM models that will be developed will show one or perhaps many of the conditions in the same model.
b. The models should show structural interface to masonry or other primary structural frames/walls as appropriate for the building type.
c. The narrative should be accompanied by screen captures that document the building of the model and with elements turned on and off so as to depict underlying masonry details not shown in the full model.
d. The masonry models may be taken from prior work by the Consultants. Since we will be sharing the models, it is expected that the models might be modified or adapted to reflect the conditions to be modeled.
e. The Consultants are encouraged to discuss the project in blogs and to mine Revit repositories to identify best-practices nationwide.

f. We recognize that representing certain masonry details in BIM will require “work-arounds”, “tricks” or “kludges” and we want Consultants to identify these as part of the process.

Deliverables

Consultants shall provide:

1. Preliminary model description:
    a. Provide a brief description of the model(s) utilized for the project. Indicate the size and type of building, and the type of construction. Specifically describe the use of masonry in the building.
    b. Indicate what types of models are available for use: architectural, structural, mechanical, energy, etc.
    c. Indicate whether clash detection was performed on the model.
    d. Indicate whether a computer program was used to design masonry elements.
    e. Indicate whether wall sections and elevations were developed using the model (live) or using 2-D line work (detached).
    f. Indicate whether the construction documents were developed solely in Revit, or with a combination of Revit and AutoCad (or with another 2-D/3-D drawing package such as SketchUp).
    g. Submit the following content checklist indicating which masonry conditions are represented in the model(s).
        a. Bonding Patterns
            i. Running bond
            ii. Stacked bond
            iii. Flemish bond
        b. Changes in bonding pattern
            i. Soldier courses
            ii. Header courses
            iii. Water tables
        c. Masonry openings and lintels
        d. Backup system
            i. CMU
            ii. Steel studs
            iii. Ties between cavity wall systems
        e. Stone Accents and other non-standard masonry units such as cast and cut stone
            i. Stone sills
            ii. Stone Lintels
            iii. Parapets
            iv. Foundation details such as plinths
        f. Relief Angles and other veneer supports in multi-story buildings
        g. Arches
        h. Masonry Pilasters
        i. Movement Joints (control and expansion joints)
        j. Masonry corner treatments
            i. Quoins
            ii. Non-90 degree corners

k. Treatment of Out-of-Plane Masonry Conditions
    i. Corbeling
    ii. Insets and Outsets
l. Non-planar walls
    i. Curvature in plan
m. Wall penetrations (mechanical, piping, etc.)
n. Masonry dimensioning practice:
    i. Wall modeling with proper modular dimensions, for example, with overall wall dimensions and window and door placement that fit within the modular block/brick dimension of 8 in. (for full bricks) and 4 in. (for half bricks).
    ii. Wall modeling without proper global modular dimension – what guidance does the BIM model provide for the cutting of masonry units, if any?
o. Bond beams and Masonry Wall Reinforcing
p. Interior concrete masonry walls
    i. Walls that extend to underside of structure
    ii. Walls that extend to above ceiling level
    iii. Attachment of top of walls to structure

2. Model Advancement: Advance the existing model to include an example of as many of the elements noted in the checklist as possible.

    a. Submit the model and 2-D drawings showing plans, elevations, and wall sections to depict the conditions noted in the content checklist.

3. Summary report: Provide a report summarizing the following:

    a. Provide a brief summary of the building, the use of Revit to develop construction documents, and specifically the use of Revit for masonry elements. Summarize your typical workflow to depict masonry in plan, section, and elevation using 3-D elements and/or 2-D line work.
    b. Update the content checklist to indicate which elements were added to the model.
    c. Discuss the Revit families, customization, and other strategies used in creation of the model.
    d. Discuss which elements from the checklist can not practically be modelled in Revit.
    e. Specifically discuss the following:
        iv. Are masonry walls typically shown in the Architectural model, Structural model, or both? Is the process different for bearing wall buildings? How are changes in wall locations and openings tracked between disciplines?
        v. Do you export masonry elements to analytical programs? If so, do you use the structural usage tags in Revit? Do you repopulate the Revit model using the analysis output to show reinforcing?
        vi. How do you perform clash detection for masonry bearing wall structures? Specifically, how do you differentiate between significant clashes through bond beams or shear walls, and insignificant clashes such as minor pipe penetrations?
        vii. Do you export masonry elements into energy modeling programs?
        viii. Does the use of Revit simplify masonry coordination, such as placement of openings in coursing, placement of structure in coursing, placement of control joints, structural interface, etc?

ix. Have you used models downstream to aid in developing masonry shop drawings? How? If not, why?
x. How do you use the Revit model for construction cost estimates for masonry wall assemblies?
xi. How do you differentiate critical masonry items such as bond beams, piers, shear walls, etc, to aid in coordination and clash detection?

f. Provide recommendations for improvements to Revit to simply the design and detailing of masonry.

Timeline

Cost and scope proposals are due to the BIM-M Project Manager and BIM-M Coordinator on September 19, 2014. The timeline is developed with a need to present the information at BIM-M Symposium 2015 on April 9, 2015.

Event	Due Date	Activity
RFP Due	9/19/2014	The RFP will be published on the BIM-M website (BIMformasonry.org).
Proposal Review	9/27/2014	Proposals will be reviewed by BIM-M leadership.
Contracts Award	10/14/2014 (anticipated)	Contracts will be negotiated and awarded.
Scope Review	11/3/2015	
Draft Models Due	1/15/2015	Draft BIM models will be due to the BIM-M Project Manager and Georgia Tech DBL.
Draft Narratives Due	2/2/2015	Draft narratives will be due to the BIM-M Project Manager and Georgia Tech DBL.
Comments Returned	2/16/2015	The Consultants will receive feedback from the project leadership and will finalize their submittals including BIM models, drawings, narratives, and screen captures.
Final Deliverables from Consultants	3/16/2015	Consultants will transmit models etc. to Georgia Tech for assembly into rough-draft document.
Consultants Present at BIM-M Symposium 2015	4/9/2015	Consultants to attend BIM-M symposium in St. Louis and present their modeling work (1.5 hours maximum).
Edits of Guide	5/1/2015	Consultants to review and comment on Guide. TMS Committee to review and comment on Guide – and provide first and last chapters.
Guide document production	7/1/2015	Georgia Tech and BIM-M project management
Guide sent to TMS TAC for review	7/1/2015	TAC review required before publication.

Ownership of Models and Information

Development of the Guide is a commitment to and service to the BIM-M initiative and the A/E profession. The models provided by the A/E firms are going to be shared and published by TMS and BIM-M to further the use of BIM in masonry projects. The Consultants will be responsible for the content of the models and retains the right to edit and modify the models and details provided. BIM-M is given an

unrestricted release to use the models and information. The models will be presented to the industry in the spirit of demonstrating best practices in BIM modeling, and not as a guide on how to design and construct masonry buildings. BIM-M will identify and credit the Consultants in the Guide but may or may not identify and credit them in subsequent usage of the models and material.

Acceptance or Rejection of Proposals

BIM-M reserves the right to reject any and all proposals when such rejection is in the best interest of BIM-M or the proposal contains any irregularities that can't be resolved through negotiations with the Consultants.

Development Costs

Consultants shall be liable for any expenses incurred in connection with the preparation, submission or presentation of a response to this RFP.

Conflicts of Interest

All Proposers must disclose any conflicts of interest with Autodesk Revit or BIM-M.

Proposal Content

Consultants may submit for one or both projects.
Separate proposals are required for each Project.
Proposals shall include:

1. Project # of proposal.
2. Team member firms (architectural, energy and mechanical) and project manager.
3. Building type and screen shot proposed for modeling.
4. Fees and itemized expenses.
5. A statement of intent to staff the project to meet the required timeline.

Proposals are to be submitted electronically by September 19, 2014 at 6pm EDT in .doc format to:

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