Building Information Modeling for Masonry (BIM-M)

Charles Clark, AIA, PE, LEED AP BD+C
Vice President Engineering Services
Acknowledgements

Much of the information and images in this presentation are from a BIMM presentation given in Sept. 2012 by:

David Biggs, PE, SE, Hon TMS
- Biggs Consulting Engineering
- (BIM-M Masonry Industry Coordinator)

Russell Gentry, PE
- Georgia Inst. of Technology
- College of Architecture
- Digital Building Laboratory
- (BIM-M Project Manager)
<table>
<thead>
<tr>
<th>Promote</th>
<th><strong>Design</strong></th>
<th>Analyze</th>
<th>Detail</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procure</td>
<td>Schedule</td>
<td>Coordinate</td>
<td>Construct</td>
<td>Maintain</td>
</tr>
</tbody>
</table>
Promote

Design

Analyze

Detail

Estimate

Procure

Schedule

Coordinate

Construct

Maintain
To unify the masonry industry and all supporting industries through the development and implementation of BIM for Masonry (BIM-M) software to facilitate smoother workflows and collaboration across all disciplines from owner, architect, engineer, manufacturer, mason, contractor, construction manager, and maintenance professionals.
Affiliated Groups

- Portland Cement Association
- Cast Stone Institute
- Marble Institute of America
- Tile Contractors Association of America
- Cold Spring Granite
- Interstate Brick
- Indiana Limestone Institute
- Masonry Institute of St. Louis
- Masonry Institute of Michigan
- Masonry Institute of America
- Northwest Concrete Masonry Association
- Concrete Masonry Association of California and Nevada
Phases

Phase I: Roadmap
• Sponsors, Workgroups, Schedule

Phase II: Development
• Model Units & Walls, Contractor Input

Phase III: Specification
• Spec, Structural Engineering, Contractor Input

Phase IV: Implementation
• Spec, Contractor Training, Architectural Design
Working Groups

- Architectural Modeling Working Group (AMWG)
- Structural Modeling Working Group (SMWG)
- Contractor/CM Working Group (CMWG)
- Construction Activities Working Group (CAWG)
- Material Supplier Working Group (MSWG)
How do the workgroups relate:

• To a specific building project?

• To BIM-M proposed activities?
Working Group Process

What will working groups produce?

- Vision for developers of BIM-M software
- Community with goodwill and momentum to develop BIM-M software
- Communication between industry stakeholders and BIM-M software developers
- Timeline and tasks for developing BIM-M software
Work Group - Goals

- Describe their processes, design, construction, etc.
- Describe the actors in their processes, identify stakeholders
- Describe how software tools are used in these processes – or not?
- Discuss design-procurement-construction issues unique to masonry
- Identify barriers to a more effective masonry industry
- Discuss barriers to sharing information
- Describe “handoffs” of information
- Detail the information requirements for software tools to work
- Create a vision for new software tools customized for masonry
- Identify data embedded in, linked to, or generated by software
- Identify barriers to achieving the vision
- Describe tasks to overcome barriers
Masonry Unit Model Definition

- Survey masonry unit manufacturers
- Solicit input from working groups
- Develop interface for the input of masonry types
- Develop data structure prototype
- Provide data structure with selected masonry units incorporated in the database
- Provide data structure to stakeholders for input of their masonry units
- Demonstrate input of masonry unit into CAD software from the database
## Masonry Unit Model Definition

<table>
<thead>
<tr>
<th>Product Drawing</th>
<th>Width</th>
<th>Height</th>
<th>Length</th>
<th>Quantity per Square Foot</th>
<th>Number of Brick per Cube</th>
<th>Color</th>
<th>Density</th>
<th>Wt</th>
<th>Cold Absorption</th>
<th>Boil Absorption</th>
<th>C/B</th>
<th>IRA</th>
<th>Efflorescence</th>
<th>U-Value</th>
<th>R-Value</th>
<th>Solar Reflective Index</th>
<th>Grade</th>
<th>ASTM Specification</th>
<th>Type</th>
<th>Voided Percent Max</th>
<th>Voided Percent Min</th>
<th>Traffic Abrasion Resistance</th>
<th>Compressive Strength</th>
<th>FM</th>
<th>Cell Area</th>
<th>Face Cell Thickness</th>
<th>sq-in</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>x</td>
<td>3.6250</td>
<td>7.6250</td>
<td>Varies 420 per MFR</td>
<td>x x x x x x x x x x</td>
<td>SW</td>
<td>C216</td>
<td>x</td>
<td>25</td>
<td>0</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Masonry Unit Model Definition

- Dimensions, density, weight
- ASTM: Standard, Grade, Type, void area
- Physical properties: Compressive strength, CWA, BWA, C/B
- Elective tests: IRA, efflorescence
- Thermal properties: U-value, R-value
- Fire resistance properties: Fire resistance rating
- Sound properties: STC rating, OITC rating
- Cleaning: Recommended product
- Manufacturer and Distributor: Contact information
Building Information Modeling for Masonry (BIM-M)

Will allow complete management of project from beginning to end of building life:

- Schematic Design thru Construction Documents
- Conflict Resolution
- Schedule Development
- Take-Offs and Cost Estimating
- Facility Management
BIM-M Questions?