WHAT IS THIS THING CALLED LOD?
Problem: How can We Define a BIM?
Problem: How can We Define a BIM?

- What is the owner expecting when they ask for “BIM” on a project?
- How much information needs to be in a model?
- How much effort will it take (how do I price it?)
- How do I know I’m meeting my deliverables?
- Who’s going to rely on it for what?
We Never Had this Problem with Paper Drawings – Why Now?
Paper vs. BIM

Precision
Paper vs. BIM

Precision
Paper vs. BIM

- Visual cues about state of development
- BIMs often carry unintended information
Response?

The Disclaimer:

This model looks great so you can look at it but you can’t use it for anything or rely on it for anything which includes, but is not limited to, everything.

If you use it for anything anyway then you have to pay my lawyers anything they want if I get sued for anything related to your use of the model for anything.

Have a nice day.
Response?

Disclaimer Approach:

*Some of it’s not reliable so don’t rely on any of it.*

Specified-Use Approach:

*Some of it’s not reliable so only rely on*

– *what I say you can,*

– *for the purposes I say you can,*

– *to the degree of precision I say you can.*
Model Progression Spec
Level of Detail
Model Development Spec
Level of Development

<table>
<thead>
<tr>
<th>Pad Footing</th>
<th>LoD 100</th>
<th>LoD 200</th>
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### § 4.3 Model Element Table

Identify (1) the LOD required for each Model Element at the end of each phase, and (2) the Model Element Author (MEA) responsible for developing the Model Element to the LOD identified.

Insert abbreviations for each MEA identified in the table below, such as "A - Architect," or "C - Contractor."

**NOTE:** LODs must be adapted for the unique characteristics of each project.

<table>
<thead>
<tr>
<th>Model Elements Using CUS Uniform Format</th>
<th>Level of Development</th>
<th>LOD</th>
<th>MEA</th>
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</tbody>
</table>
LOD Definitions

100 Conceptual. The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

200 Generic Placeholders. The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

300 Specific Assemblies. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

400 Detailed Assemblies. The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

The Level of Development Definitions are produced by the AIA and have been used here by permission. Copyright © 2011. The American Institute of Architects. All rights reserved.
LOD Definitions

LOD 100
Conceptual

Steel Braced Frame
$20-26 /sf
LOD Definitions

LOD 100 → LOD 200
Conceptual → Generic
Placeholders
LOD Definitions

LOD 100 → LOD 200 → LOD 300

- LOD 100: Conceptual
- LOD 200: Generic Placeholders
- LOD 300: Specific Assemblies
LOD Definitions

- **LOD 100**  
  Conceptual

- **LOD 200**  
  Generic Placeholders

- **LOD 300**  
  Specific Assemblies

- **LOD 400**  
  Details
**Level of Development vs. Level of Detail**

Level of **Detail** – What it looks like
Level of **Development** – How much it’s been thought through

**Level of Detail**
- Looks like specific steel shapes
- Location can be measured precisely

**Level of Development**
- Have the shapes been engineered?
- Are they in the final locations?
AIA / AGC BIMForum LOD Specification

www.bimforum.org/lod
AIA / AGC BIMForum LOD Specification

- It’s a dictionary
- The project team writes the story

www.bimforum.org/lob
Clarifications

- LOD does not equate to a design phase
- There’s no such thing as an LOD ### model

<table>
<thead>
<tr>
<th>§ 3.3 Model Element Table</th>
<th>Schematic Design</th>
<th>Design Development</th>
<th>Foundation Permit</th>
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AIA Technology in Architectural Practice
Exploring the LOD Specification
7/29/2014
HOW DO WE AGREE TO IT?
AIA DOCUMENTS
AIA Digital Practice Documents
E203 Flowdown
E203 – 2013 Article 4 BIM

✓ Establishes BIM expectations

✓ Internal use only without sharing expectation vs. sharing with other Project Participants with expectation of reliance

ARTICLE 4 BUILDING INFORMATION MODELING PROTOCOLS

§ 4.1 If the Parties indicate in Section 3.1 that Building Information Modeling will be used on the Project, specify below the extent to which the Parties intend to utilize Building Information Modeling and identify the provisions of this Article 4 governing such use:

☐ The Parties shall utilize Building Information Modeling on the Project for the sole purpose of fulfilling the obligations set forth in the Agreement without an expectation that the Model will be relied upon by the other Project Participants. Unless otherwise agreed in writing, any use of, transmission of, or reliance on the Model is at the receiving Party’s sole risk. The remaining sections of this Article 4 shall have no force or effect.

☐ The Parties shall develop, share, use and rely upon the Model in accordance with Sections 4.2 through 4.10 of this Exhibit.
Identify anticipated BIM uses

§ 4.2 Anticipated Building Information Modeling Scope. Indicate below the portions of the Project for which Modeling will be used and the anticipated Project Participant responsible for that Modeling.

| Project Portion for Modeling | Responsible Project Participant |

§ 4.3 Anticipated Model Authorized Uses. Indicate below the anticipated Authorized Uses of the Model for the Project, which Authorized Uses will be agreed upon by the Project Participants and further described for each LOD in G202–2013.

§ 4.4 Ancillary Modeling Activities. Indicate additional Modeling activities agreed upon by the Parties, but not to be included in AIA Document G202–2013, if any.

(Describe any Modeling activities, such as renderings, animations, performance simulations, or other similar use, including the anticipated amount and scope of any such Modeling activities.)
WHAT’S IT GOOD FOR?
What’s it Good for?

In general:
• Define models – deliverables, milestones, information exchanges
• Define Authorized Uses - enables reliance
What’s it Good for?

Specific:
- Mapping firm standards – defines your “business as usual”
- Defining information exchanges in a BxP
- Scoping modeling effort
- Focusing the modeling effort
- Developing a baseline design schedule
- Defining use-case milestones
- Setting milestones based on standard workflow
- Determining workflow based on milestone dates
- Defining a design/build bridging package
- Defining a design architect – executive architect handoff package
Take-Aways

• LOD is a language.
• LOD allows us to specify milestones, deliverables, information exchanges, etc. with a high degree of clarity.
• LOD allows us to use models for transmitting information reliably and safely.
Just to clarify...

DETAIL = How much information has been modeled

DEVELOPMENT = The degree to which a modeled element and attached information has been thought through
Just to clarify...

DETAIL = How much information has been modeled

DEVELOPMENT = The degree to which *project team members may rely on the information when using the model*
Just to clarify...

DETAIL = Input

DEVELOPMENT = Reliability

How does this affect implementation of the LOD concept...?
The LOD “Language”

- **LOD 100**: MASSING
  - “ESTIMATE IT”

- **LOD 200**: GENERIC ASSEMBLIES
  - “SPECIFY IT”

- **LOD 300**: SPECIFIED ASSEMBLIES
  - “BID IT”

- **LOD 400**: DETAILED COMPONENTS
  - “BUILD IT”

- **LOD 350**: ACTUAL ASSEMBLIES
  - “BUY IT”

AIA Technology in Architectural Practice
An Example of LOD

100 = Cost assumption or simple object (*light fixture*)

200 = Generic type (*pendant*)

300 = Design specified, lamping/lumens, *preferred* model

350 = Actual model, Nuvo Lighting 60-590

400 = All mounting/installation detail
How do you use the LOD Spec?

Owner/Architect Agreement

BIM/Digital Data Exhibit (AIA E203)

Owner/Contractor Agreement

BIM Protocol Form (AIA G202)

‘Executive Summary’ Select BIM uses Rely on model?

Model Element Table

Details of BIM uses ‘BIM Execution Plan’
PRACTICAL EXAMPLES

DO U HAZ HANGERS
IN UR BIM MODEL?
# Minimum Modeling Matrix (M3)

**Document Release: 20120913**

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# HOK’s Minimum Modeling

## Architecture

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<th>Construction Doc’s or Technical Design</th>
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<td>Verify coordinates with deliverables</td>
<td>Verify coordinates with deliverables</td>
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<td>Levels</td>
<td>Finish floors, roof, parapets</td>
<td>Interstitial levels, loading docks</td>
<td>Coordinate levels with structural model</td>
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<td>Exterior Enclosure Notes</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Design Criteria - loads, movements, energy, fire ratings &amp; separations</td>
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<td>○</td>
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<tr>
<td>Key Notes</td>
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<tr>
<td>Coordinate Keynotes with Master Keynote Listing Sheets</td>
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</tr>
</tbody>
</table>
HOK’s Minimum Modeling
HOK’s Minimum Modeling
Applying LOD

LOD 200

LOD 300
Applying LOD
Visual Quality Control

LOD 200 Provided

LOD 300 Provided

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Verifying LOD

• An organization principle
  – Walls, doors...
  – Uniformat, Omniclass...

• Two measurable parameters:
  – LOD Required
  – LOD Provided

LOD Required \(\leq\) LOD Provided
Verifying LOD
Implementation Considerations

• Setting & managing expectations
• Aligning with your design methods
• Avoid redundant modeling
  – Address separation of complex assemblies
Objectives

• Value & ROI
• Project Examples
• Design Workflows
• Project Schedule
Incentive to Participate

Project Team

• Quantify difference between firm’s Standard of Care & project scope
  – Add service for additional work

• Reduce over-modeling & parallel modeling by project team

• Drives increased collaboration

• Clearly identifies design liability

• Owner asks them to
What about the Architect?

- Track Internal Standards
  - QA/QC for Project & BIM managers
  - Reduce over-development of models
- Model Completeness
  - What is completed? What still needs development?
  - Designer/Engineer added/leaves, which system is complete?
  - Manager wants to view progress, estimate time remaining
- Differentiate BIM abilities from competition
- Less liability for the model, Specified-Use Approach
Why does the owner care?

- Describe owner requirements
- Effective handovers
- Clearly identifies where information is
- Reduce over-modeling & parallel modeling
- Schedule improvements
- Communication
### Project Examples

**DBB Project – QTO for bidding process**

<table>
<thead>
<tr>
<th>LOD</th>
<th>MEA</th>
<th>Date</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>E</td>
<td>A/E</td>
<td>200</td>
<td>N/M</td>
</tr>
<tr>
<td>E</td>
<td>A/E</td>
<td>300</td>
<td>N/M</td>
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</tbody>
</table>

**Use Case**

- **QTO**
  - **100% CD & PERMIT**

---

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### Package release milestones

- Using LOD to document what is reliable in the model when

## Design Assist – Coordination and As-Built

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In-Model Workflow

Image courtesy of: Abel Cornwell - Autodesk

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In-Model Workflow

Advantages

- QA/QC
- Reduce over-modeling & parallel modeling
- Model Completeness
- Clearly identifies design liability
- **Communication**

Image courtesy of: Abel Cornwell - Autodesk

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Schedules

Original Design and Construction Plans

Results using normal sequence

Adjusted sequence Using MDS to communicate partial releases for coordination

Optimal Const. Start

Optimal Const. Completion

Partial releases at LOD 300 / 350

Reduction of overall project schedule over normal sequence

Schedules

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Take-Aways

• Minimal impact on workflow
• Value & ROI for your firm & the owner
• Improve your project communication

Call to Action

• Try the AIA G202 & E203 on a project
• Document your firms LOD for delivery milestones and use it for internal QA/QC
• Introduce a client to the process and the benefits