2020

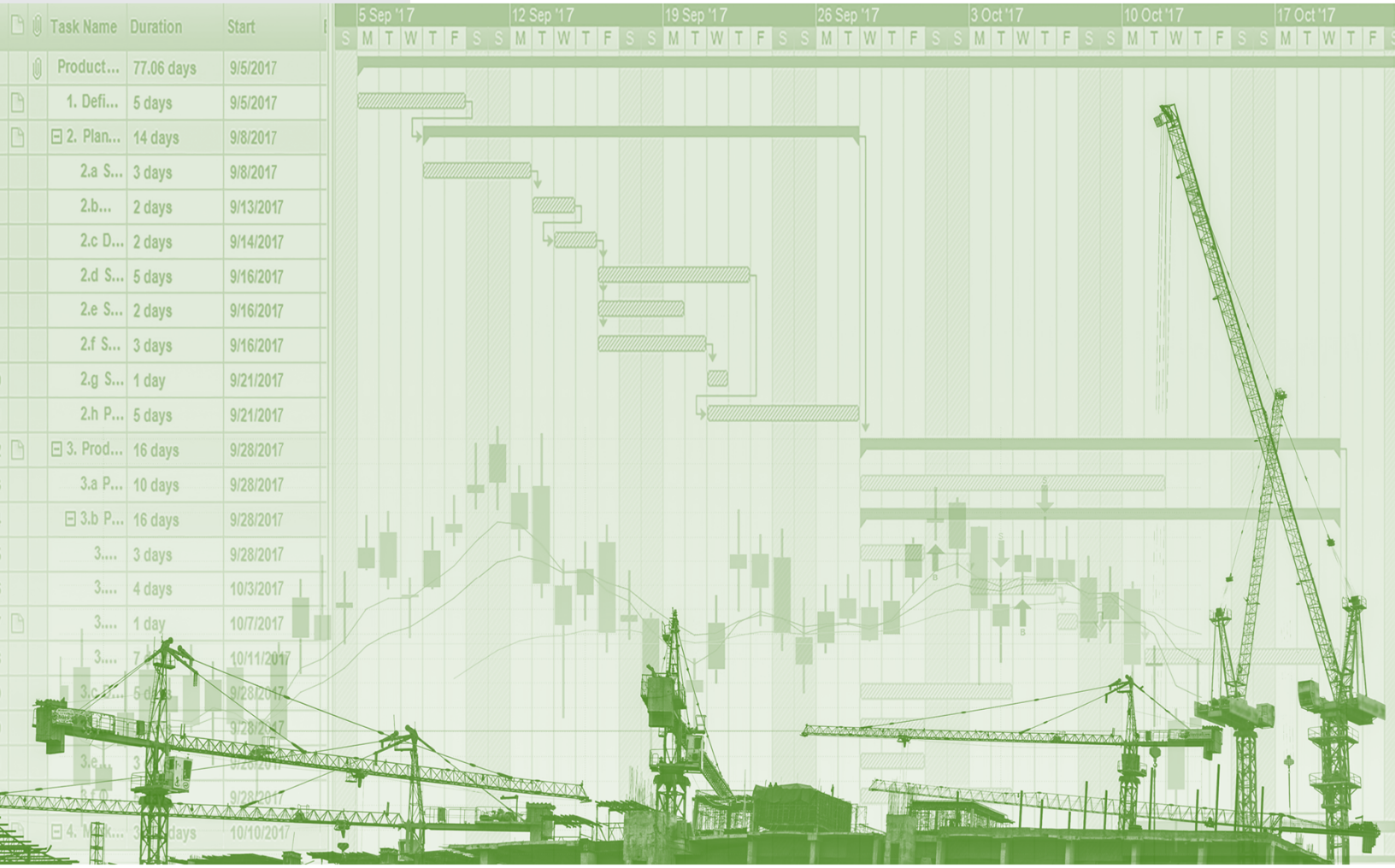
BIM FORUM

# Estimating & Scheduling with BIM Guide

## *BIMForum Estimating & Scheduling Taskforce*

*Chairs: Brent Pilgrim, Will Ikerd, P.E, Benjamin Crosby*

*Version 20.00 | November 2020 Public Comment*




DBIA DESIGN-BUILD INSTITUTE OF AMERICA

ASCEND BUILDING KNOWLEDGE FOUNDATION

CD-BIM.com Certificate of Development in Building Information Modeling

*The purpose of this guide is to introduce BIM estimating and scheduling concepts to teams on small to midsized projects that may have some team members who have never previously used BIM.*

# Estimating & Scheduling with BIM Guide

## GUIDE AND COMMENTARY

November 2020 Public Comment Draft

*Brent Pilgrim, Committee Chair*
*Will Ikerd, P.E., Committee Vice-Chair*
*Benjamin Crosby, Committee Vice-Chair*

*Nothing contained in this work shall be considered the rendering of legal advice. Readers are responsible for obtaining such advice from their own legal counsel. This work and any forms herein are intended solely for educational and informational purposes.*

*All images are intended to illustrate building conditions in compliance with common building codes. However, the images do not take into account site specific conditions, regional building codes and other important information that may require a material change for specific projects. These illustrations do not make representation for fitness for a particular project nor for code or design compliance.*

# BACKGROUND

The BIMForum Estimating and Scheduling with BIM Guide Development Taskforce was created in 2019 following the BIMForum Conference in St. Louis, MO, as a response to a call for an industry-wide effort to qualify short-term behavioral, workflow, and functional challenges to model-based quantity take-off and identify long-term strategies and best practice solutions that enable and support scalable, 4D and 5D practices in the AEC industry. In the absence of scalable standards in the preconstruction field for model-based estimating, the Taskforce's goal was to bring awareness and begin advancing model-based workflows in a concerted and meaningful way. Key issues evaluated by this Taskforce include:

- Model content challenges including element LOD predictability, meta data deficiencies, and model quality issues
- Workflow related issues such as model authoring, parameter authoring, and information exchanges
- Technology related limitations and opportunities to build vendor relationships
- Clarity in definition between model-based workflows and "integrated" estimating workflows (a.k.a "5D")
- Creation of industry accepted model-based estimating standards & guidelines
- Creation of industry accepted model-based scheduling standards & guidelines

The result of the Taskforce's initial focus is the development of the first of its kind, model-based estimating framework or template, and the subsequent development of an initial set of building systems (scopes of work) to set the direction of the Estimating and Scheduling with BIM Guide. The model-based scheduling component of the guide is still to be developed and the taskforce committee is always open to new members with this expertise.

The Estimating and Scheduling with BIM Guide aims to address three primary objectives that currently prohibit wide scale adoption of model-based workflows beyond model authoring and design coordination purposes.

1) Define and establish a standardized, scalable methodology for quantifying building systems from a BIM, regardless of model element LOD, therefore enabling model-based estimating in all design phases.
    a. To achieve this end, the Guide identifies a model-based quantification and general estimating strategy for different building systems represented at different stages of their development (LOD) and use in the design and construction process.
    b. For each building system or scope of work, the Guide acknowledges the already established and accepted model definition characteristics defined by the LOD Specification, and…
    c. Provides supplemental information provided to support estimating and scheduling practices.
2) Identify and prescribe minimally-viable model geometry and related meta data for identification of model content and quantification of model content depending on the target model element LOD established in the BIM execution plan for the project.
    a. Relying on the model definitions provided by the LOD Specification, the Guide enables project teams to develop predictable, reliable, and transparent expectations for model content intended to be used for estimating or scheduling purposes.
    b. The ability to find and identify model elements based on set properties and meta data regardless of the model authoring platform, or quantification or estimating platform.
3) Establish a standardized template for the expansion of building systems covered in the LOD Specification.
    a. The Guide establishes a standardized template, which can be replicated easily to encompass additional building systems.

As a result of achieving these three objectives, the purpose of the Guide is to provide a reference tool for owners and their teams seeking to implement model-based workflows for scheduling (4D) and estimating (5D) activities using a single source of truth (SSOT) project model.

## TASKFORCE MEMBERS

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# EXECUTIVE SUMMARY

The BIMForum Estimating and Scheduling with BIM Guide is a reference tool intended to facilitate scalable and replicable workflows for estimating and scheduling activities using a SSOT project model.

While model-based estimating and scheduling has increased in adoption as part of preconstruction and scheduling workflows, there remain significant challenges to creating scalable and replicable practices that serve the industry as a whole and not simply as individual company best practices. To date, when and where model-based workflows are executed, they are typically achieved by small-scale customized routines developed on a project by project basis that are more likely an ad-hoc reaction to model information authored, rather than an anticipated receipt of coordinated and predictable data transfers. Additionally, model-based workflows typically do not occur in earlier design phases because of a lack of model development, or lack of certain model elements (representing certain building systems or scopes of work) all together. This is only a deficiency because the industry has not developed estimating workflows that rely on lesser developed project information (i.e. earlier LOD phases) and do not typically consider the idea that building system quantities can be derived, or inferred, from other model-based project elements. Further, some of the best examples of model-based quantification exercises today represent entry-level productivity gains as it relates to model-based workflows and some distinction needs to be made between model-based quantification and truly integrated (5D) estimating workflows which offer significant productivity and efficiency improvements as well as opportunities for automation to enter the preconstruction field in the near future. The critical dependence of these and other types of next generation innovations succeed or fail on the ability of the industry to standardize quantification and estimating practices that build around predictable, reliable, and repeatable strategies.

The taskforce recognized that BIMForum LOD specification, whose development began in 2012, has achieved broad and even international acceptance as an industry standard for model element development, and as such provide a solid foundation to build other model-based workflows. Therefore, the Estimating and Scheduling with BIM Guide is intended to become a standard that accompanies and supplements the BIMForum Level of Development.

As background, Building Information Modeling (BIM) presents information about a construction project or structure in the form of three-dimensional graphical representations of elements (e.g.,doors, beams, etc.), which can be further associated with information about other characteristics of those elements. It is possible for the graphical representation of an element, taken alone, to suggest that greater accuracy or intention can be attributed to the element than is in fact the case. The BIMForum Estimating and Scheduling with BIM Guide was developed to provide a systematic way for preconstruction teams to utilize a model for model-based workflows regardless of the level of development as predictable data sets for estimating and scheduling purposes.

Discussions within the BIMForum led to the creation of a multi-disciplinary task force to develop and maintain the Estimating and Scheduling with BIM Guide.

Users of the Estimating and Scheduling with BIM Guide are cautioned that it does not prescribe or guarantee an accuracy level associated with model-based estimating practices. Estimate accuracy remains the estimating team's responsibility. It is believed, however, that the availability of definitions will reduce the risk of miscommunication among project teams' members. This is achieved when the expectations are established, through easier identification of what each team member is expected to deliver. The Guide will help create greater predictability of the level of effort that is required to create reality capture deliverables.

The Estimating and Scheduling with BIM Guide follows the BIMForum LOD Specification closely in that it is organized by CSI Uniformat 2010, with the subclasses expanded to Level 4 (and in a few cases to Level 5) to provide detail and clarity to the element definitions. The LOD Specification addresses only LOD 100 through

LOD 400 of the AIA's LOD Schema, along with a new level – LOD 350 – which was added between LOD 300 and LOD 400 to better address the information levels required for effective trade coordination. The LOD Specification does not address LOD 500 since that LOD relates to field verification and is not an indication of progression to a higher level of geometry or information.

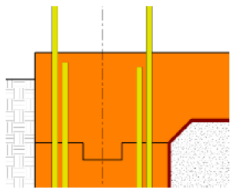
For quick reference, the BIMForum's interpretation of the LOD definitions are below but readers are encouraged to thoroughly read and understand the Level of Development Specification as a foundation for understanding the Estimating and Scheduling with BIM Guidelines.

- LOD 100 elements are not geometric presentations. They may be symbols or other generic representations of information that can be derived from other model elements. Any information derived from LOD 100 elements must be considered approximate.
    - *BIMForum Interpretation: LOD 100 elements are not geometric representations. Examples are information attached to other model elements or symbols showing the existence of a component but not its shape, size, or precise location. Any information derived from LOD 100 elements must be considered approximate.*
- LOD 200 elements are represented graphically but are generic placeholders, e.g., volume, quantity, location, or orientation. Any information derived from LOD 200 elements must be considered approximate.
    - *BIMForum interpretation: At this LOD elements are generic placeholders. They may be recognizable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate.*
- LOD 300 elements are graphically represented as specific systems, objects, or assemblies from which quantity, shape, size, location, and orientation can be measured directly, without having to refer to non-modeled information such as notes or dimension call-outs.
    - *BIMForum interpretation: The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs. The project origin is defined and the element is located accurately with respect to the project origin.*
- LOD 350 elements are enhanced beyond LOD 300 by the addition of information regarding interfaces with other building systems. For example, an LOD 350 masonry wall element would include jamb conditions, bond beams, grouted cells, dowel locations, and joints – information that enables the model user to coordinate the wall element with other systems in the structure.
    - *BIMForum interpretation. Parts necessary for coordination of the element with nearby or attached elements are modeled. These parts will include such items as supports and connections. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs.*
- LOD 400 elements are modeled at sufficient detail and accuracy for fabrication of the represented component.
    - *BIMForum interpretation. An LOD 400 element is modeled at sufficient detail and accuracy for fabrication of the represented component. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs..*

Similar to the LOD Specification, the Estimating and Scheduling with BIM Guide does not prescribe who the author of a particular component at a given LOD should be, as that will vary from one project to another. However, the document does provide a concise schematic means through the spreadsheet in Part II for a project team to identify model element authors, again in the interest of improving communication among model users. In addition, the LOD Specification task force has been working with software developers to provide a means within the software of tagging individual elements within a model with their current LOD level.

The LOD Specification is intended as a reference standard, but is also intended to evolve as the use of BIM develops. The Specification is updated annually, and previous versions are maintained on the BIMForum website (www.bimforum.org/lod). Users are invited to provide comments and recommendations for consideration in future editions.

# INTRODUCTION TO THE ESTIMATING & SCHEDULING WITH BIM GUIDE

| | | |
|---|---|---|
| Primary Cost Element/Scope Item: | |  |
| Uniformat 2 Category: | | |
| Omniclass Category: | | |
| Example Use Case: | | |
| Model Quantity Origin: | | |
| Model Quantity Source Geometry: | | |
| Estimating-based Model Parameters & Properties: | | |
| Identification-based Model Parameters & Properties: | | |
| Correlated Cost and Scope Items: | | LOD 350 |
| Adjacent, Modeled Cost Elements | | BIM Forum LOD Specification Reference |
| Supporting Information: | | *Element modeling to include:*<br>*• All penetrations modeled to rough opening dimensions*<br>*• Pour joints (Per ACI - Construction Joints)*<br>*• Control joints*<br>*• Expansion joints*<br>*• Water stops*<br>*• Rebar and any embedded elements modeled at congested areas where specified by project BIMXP*<br>*• Void boxes*<br>*• Anchor rods*<br>*• Dowels*<br>*• Post-Tension profile and stands if required by BXP* |
| Project Meta Data: | | |
| Cost Estimating Guidelines: | | |



## 1. OVERVIEW

### 1.1. Purpose & Intent

1.1.1. The BIMForum Estimating and Scheduling with BIM Guide is a reference tool that provides project teams, intending to use a SSOT project model for downstream model-based workflows including scheduling (4D) and estimating (5D), a strategy to author model content in a manner that it can be a) identified based on meta data properties, and b) quantified for estimating and scheduling purposes.

1.1.2. The Guide is intended to reinforce the model definitions already established in the LOD Specification produced by the BIMForum.

1.1.3. As noted in the LOD specification, there LOD's are not defined by design phases, and there is no such thing as an "LOD ### model." Building systems progress from concept to precise definition at different rates, so at any given time different elements will be at different points along this progression.

1.1.4. The Guide does not establish a set of requirements as to what is modeled when, or by whom. Further, it does not establish who is responsible for content defined for estimating or scheduling purposes. Rather it is a language by which users can define these requirements for their project teams. This clear articulation allows project teams and subsequent model authors to define what purposes and workflows their models can be consumed for and within, and allows downstream users to clearly understand the usability and the limitations of the models they are receiving.

1.1.5. As noted in the Background portion of the guide, the estimating with BIM component of the guide now has a strong foundation to launch from while the scheduling with BIM component is still in preliminary development.

1.1.6. To accomplish this purpose, the guide is offered as

1.1.6.1. A standard to be adopted and incorporated into a project execution plan by project teams desiring to utilize model-based estimating and scheduling workflow.

1.1.6.2. A reference for teams, including owners, to specify BIM deliverables and to get a clear picture of what will be included in a BIM deliverable.

1.1.6.3. A guide to help model authors and team members explain the information and detail that needs to be provided at various points in the design process to facilitate estimating and scheduling workflows.

1.2. Organization of the Guide

1.2.1. The Guide is intended to reinforce and supplement the use of the BIMForum LOD Specification. In no way, is the Estimating and Scheduling with BIM Guide intended to change the guidance offered by the LOD Specification.

1.2.2. From an organization standpoint, the Guide closely follows the same organization structure found in the LOD Specification in that it is organized by CSI Uniformat 2010, and the subsequent LOD breakdowns associated with each building system.

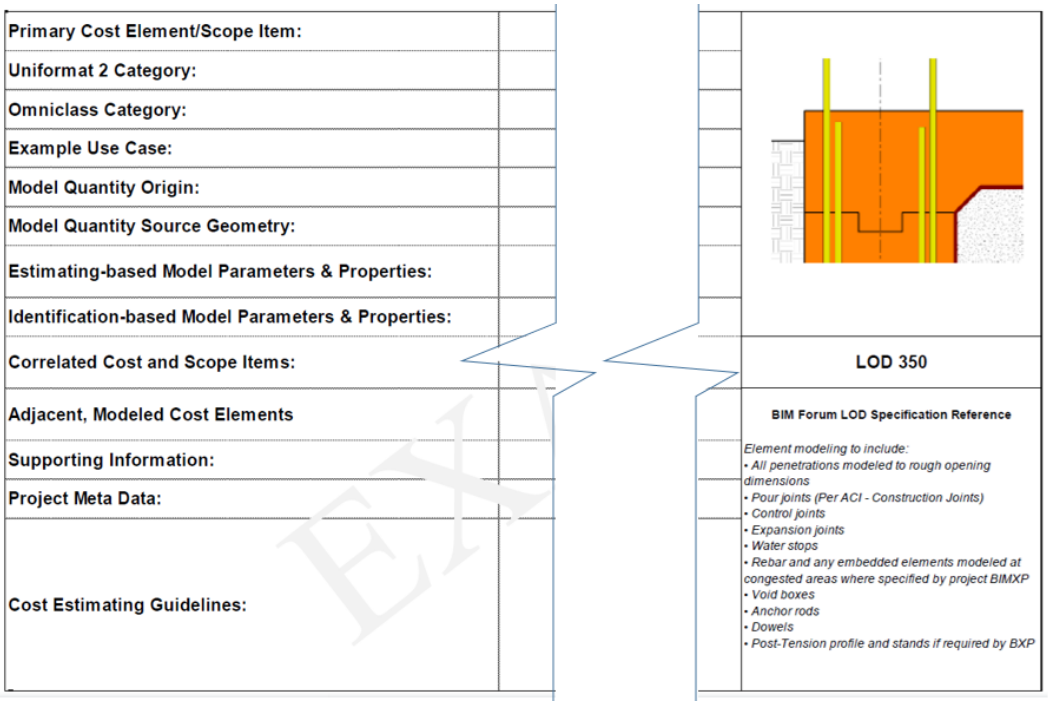
## 2. USING THE MODEL-BASED ESTIMATING GUIDELINES

2.1. Model-Based Estimating Template Table Structure

2.1.1. The template table for all building systems guidelines contain two primary elements:

2.1.1.1. The right-side of the table is a reference to the pre-existing BIMForum Level of Development Specification

2.1.1.2. The left-side of the table contain the model-based estimating guidelines



2.1.2. *Primary Cost Element/Scope Item*
The first row on the left side of the table identifies the building system in focus and identifies it as the "Primary Cost Element/Scope Item". This should correlate exactly to the model element being defined in the same section in the LOD Specification.

2.1.3. *Uniformat 2 Category*
Uniformat 2 is provided because it follows the LOD Specification and because it is an effective classification structure for estimates that occur in earlier design phases and building systems as a whole. This notation is intended to serve as a reference tool for model authors who may not be familiar with Uniformat, or where a particular scope of work belongs in the Uniformat system and need this information when authoring model elements. It is also a key piece of meta data identified for use later in the guide.

2.1.4. *Omniclass Category*
The Omniclass category is also intended to serve as a reference for model authors who may not be familiar with Omniclass, or where a particular scope of work belongs in the Omniclass system. Omniclass is an accepted standard for classifying building elements as well.

2.1.5. *Example Use Case*
As noted in the LOD specification, there LOD's are not defined by design phases. As a result, model authors may use a wide variety of LOD's across a model at any given design phase. The example use case is intended to provide guidance to teams as to when a particular estimating guideline and quantification strategy could be deployed based on the LOD. As an example, a model element authored to LOD 300 could in theory be used in schematic design as well as design development phases. Regardless of the design phase, the Guide provides the necessary information to quantify that building system at that LOD.

2.1.6. *Model Quantity Origin*
Model quantity origin is a highly innovative concept to come out of the Estimating with BIM Taskforce. The model quantity origin prescribes how quantities for various building systems are able to be derived from a model, at a given LOD. This is a relatively new concept that enables model-based estimating to occur at all design phases, regardless of how developed a given building system is. The Guide identifies three model quantity origin types:

2.1.6.1. Model-Inferred Quantities – These are quantities used in the estimation of a particular building system that are inferred from, or approximated, by referencing another element or model object because there is not a first-class model element to represent that building system in the model. An example of a model-inferred quantity would be to approximate a column count for a structural frame, based on a preliminary structural grid for a massing, prior to columns existing in a model as first-class model elements/objects.

2.1.6.2. Model-Informed Quantities – These are quantities used in the estimation of a particular building system that are informed from a model object related to the building system being estimated, but because of LOD limitations there may not a one-to-one relationship from the object to the quantity. An example of a model-informed quantity would be approximating exterior skin material quantities from generic model elements representing the exterior envelope as a whole, but not containing enough information to directly tie quantities to individual material types.

2.1.6.3. Model-Based Quantities – These are quantities used in the estimation of a particular building system that are based on a first-class model element/object serving as a direct and distinct representation of that building system and whose model quality and LOD allow

for a direct calculation of quantity from that object. An example of a model-based quantity would be cubic yards of concrete calculated directly from a model element representing a spread footing with accurate dimensions providing volumetric information.

2.1.7. *Model Quantity Source Geometry*
Model quantity source geometry forms the relationship of the quantity to the model object source geometry. In other words, when used in combination with the Model Quantity Origin, it provides the source (model object) for the quantity being calculated for a particular building system. For example, in order to calculate cubic yards of concrete for a drilled pier when the model quantity origin is model-based, the model quantity source geometry is likely to be a first-class pier/column model object.

2.1.8. *Estimating-Based Model Parameters & Properties*
The estimating based model parameters and properties describe which model parameters and properties may be used to generate quantities for estimating the building system, and is used in coordination with the model quantity origin.

2.1.9. *Identification-Based Model Parameters & Properties*
The identification based model parameters and properties describe what properties the model author and/or estimator can use to locate and identify the model object in the model.

2.1.10. *Correlated Cost and Scope Items*
The correlated cost and scope items simply serve as a guide to identify other related cost items that can also be quantified using this model object and are closely related to the current building system being estimated.

2.1.11. *Adjacent Modeled Cost Elements*
The adjacent modeled cost elements simply serve as a guide to identify other related cost items that are adjacent to this scope of work and are likely to be estimated using a different model object.

2.1.12. *Supporting Information*
The supporting information is intended to describe supplemental project and design information that might aid the model author and/or the estimator working with a particular building system. Examples might include structural narrative information not contained in the model element, but necessary for accurate estimating.

2.1.13. *Project Meta Data*
Project meta data is other data that will aid in the estimating process and could be added as model properties, but are not necessary. It is acceptable to identify project meta data using other means.

2.1.14. *Cost Estimating Guidelines*
The cost estimating guidelines serve as an aid to understand typical estimating strategies for a particular building system. They are not hard and fast rules, but provide guidance to both the estimator and the model author as to how a particular building system may be estimated for a given LOD.

## *3.* GLOSSARY

3.1. 4D – Refers to model-based scheduling practices where three-dimensional project model objects are combined with schedule information (time-based dimension) to create a visually-intelligent schedule conveying time-based and sequence based information.

3.2. 5D – Refers to model-based estimating practices where three-dimensional project model are combined with cost information (cost dimension) to create a cost estimate that is linked to model objects from the SSOT project model. 5D is also referred to as “Integrated Estimating” and differs from “Model-Based” estimating because it relies on scalable, replicable standards that support and enable machine-based learning and automation practices which significantly increase productivity factors.

3.3. BIM – Building Information Model

3.4. Integrated Estimating – See “5D”

3.5. LOD – Level of Development

3.6. Meta Data – Refers to non-geometric model data that is that is tied to a model. It could be represented as model object properties.

3.7. Model-Based Estimating – Refers to quantity take-off practices where building system quantities are derived from a three-dimensional project model. Model-based estimating is typically seen as an entry-level step towards Integrated estimating practices, but different in that quantifying from a model as a stand-alone practice does not require scalable, and replicable standards. Often, model-based estimating occurs as an ad-hoc, highly customized routine built to support a project by project process.

3.8. Model Inferred – Refers to a quantity takeoff strategy where building system quantities are approximated from, or “inferred” from model objects, but do not necessarily correlate one to one with model objects being used to approximate quantities.

3.9. Model Informed - Refers to a quantity takeoff strategy where building system quantities are approximated from, or “informed” from model objects that often relate to, but do not necessarily correlate one to one with model objects being used to approximate quantities.

3.10. Model Quantity Origin – Refers to the method used to arrive at a quantity for a given building system

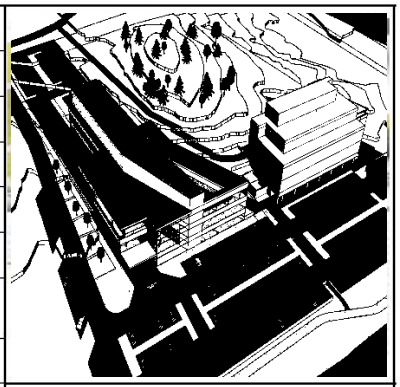
3.11. Model Quantity Source Geometry – Refers to the source geometry (model object) used for quantifying a given building system

3.12. SSOT – Single Source of Truth

# THE ESTIMATING & SCHEDULING WITH BIM GUIDE

| Uniformat | Omniclass | Description | LOD |
|---|---|---|---|
| **A** | **21-01** | **SUBSTRUCTURE** | |
| A1010.30 | 21-01 10 10 30 | Column Foundations (Deep Foundations) | 100 |

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Column Foundations (Deep Foundations) - Drilled Piers | |
| **Uniformat 2 Category:** | A1010.30 | |
| **Omniclass Category:** | 21-01 10 10 30 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | N/A at LOD 100 - See A4010 - Slab on Grade for this scope of work and LOD | |
| **Model Quantity Source Geometry:** | N/A at LOD 100 - See A4010 - Slab on Grade for this scope of work and LOD | |
| **Estimating-based Model Parameters & Properties:** | N/A | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | Foundation System | |
| **Adjacent, Modeled Cost Elements** | Structural Frame | |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for deep foundations are not typically identified at a deatil level at this LOD. Cost for drilled piers are often calculated on a $/GSF value being assigned to the component or system (based on historical cost of similar type projects and other known information). | |



**LOD 100**

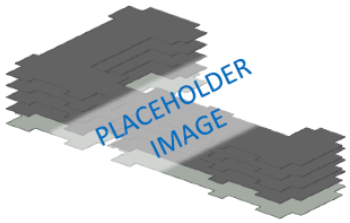
**BIM Forum LOD Specification Reference**

*Assumptions for foundations are included in other modeled elements such as an architectural floor element or volumetric mass that contains layer for assumed structural framing depth.*

*Or, schematic elements that are not distinguishable by type or material. Assembly depth/thickness and locations still flexible.*

## A1010.30 21-01 10 10 30 Column Foundations (Deep Foundations) 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Column Foundations (Deep Foundations) - Drilled Piers | |
| **Uniformat 2 Category:** | A1010.30 | |
| **Omniclass Category:** | 21-01 10 10 30 | |
| **Example Use Case:** | Conceptual Design through Schematic Design | |
| **Model Quantity Origin:** | Model-Inferred or Model-Informed | |
| **Model Quantity Source Geometry:** | Use the slab object (native object) to infer pier counts. Use structural gridlines/grid intersections if they can be counted parametrically to inform column counts. | |
| **Estimating-based Model Parameters & Properties:** | # of Grid Intersections by Structural or Arch Gridlines<br>Slab Area (SF)<br>Perimeter (LF) | Counts (EA)<br>Length (LF) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | N/A | |
| **Adjacent, Modeled Cost Elements** | Horizontal Structural Elements (Slabs) | |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated structural design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for deep foundations should be at least model-inferred at this LOD, meaning costs are based on model parameters of a first class model object (in this case the area of the ground level slab or gridline system), and use a unit price appropriate for the project. The cost should take into account any structural narrative information that may also support it including anticipated pier sizes and or depths. Pier foundations costs should be specifically identified in Uniformat Category A10 and captures as either a $/SF value of the slab, count-based quantity (ea), or length-based quantities (VLF), with proper allowances reflecting the maturity of the design at this stage. | |



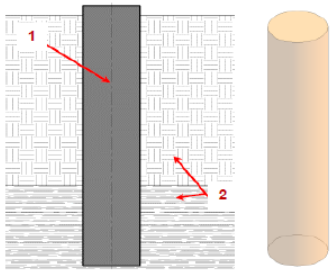

**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Approximate size and shape of foundation element*
*• Structural building grids for local project coordinate system are defined in model and approximately coordinated with civil coordinates.*

## A1010.30 21-01 10 10 30 Column Foundations (Deep Foundations) 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Column Foundations (Deep Foundations) - Drilled Piers | |
| **Uniformat 2 Category:** | A1010.30 | |
| **Omniclass Category:** | 21-01 10 10 30 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class pier/column object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Diameter of Pier (Inches)<br>Length of Pier (LF)<br>Top of Pier & Bottom of Pier Elevations | Rebar Density as #/LF, #/CF or Other<br>Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Pier Drilling Activity<br>Pier Casing, If Applicable (Permanent or Temp)<br>Rebar/Reinforcing Steel | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Belled Pier Bottoms, If Applicable<br>Pier Accessories (Sleds, Bolster Chairs, etc.) |
| **Adjacent, Modeled Cost Elements** | Pier Caps<br>Concrete Columns<br>Foundation Walls | Other Foundation Elements |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated structural design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for drilled piers should be model-based at this LOD, referencing the parameters of a specific, first class pier or column model object, whose measurements, both diameter and length, are quantifiable. Estimates for drilled piers should be inclusive of the pier drilling activity, casing (whether permanent or temporary), reinforcing (defined as #/LF or #/CY or defined by bar type in the structural narrative), and belled pier bottoms if applicable. Other assumptions associated with the model element might include material strength (psi) of the material, and access or other constructability concerns. | |



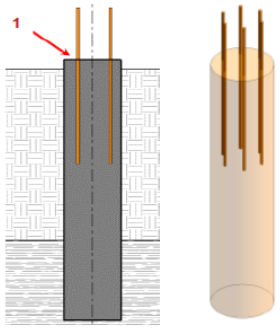

**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Assumed bearing depth per geotechnical report with designed penetration geometry modeled.*
*•Top of Pier*
*•Size of Pier*
*•Area of bearing influence - modeled or accomodated by model checking software*

## A1010.30 21-01 10 10 30 Column Foundations (Deep Foundations) 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Column Foundations (Deep Foundations) - Drilled Piers | |
| **Uniformat 2 Category:** | A1010.30 | |
| **Omniclass Category:** | 21-01 10 10 30 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class pier/column object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Diameter of Pier (Inches)<br>Length of Pier (LF)<br>Top of Pier & Bottom of Pier Elevations | Pie Bell Sizes, If Applicable<br>Rebar Density as #/LF, #/CF or Other<br>Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Pier Drilling Activity<br>Pier Casing, If Applicable (Permanent or Temp)<br>Rebar/Reinforcing Steel | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Pier Accessories (Sleds, Bolster Chairs, etc.) |
| **Adjacent, Modeled Cost Elements** | Pier Caps<br>Concrete Columns<br>Foundation Walls | Other Foundation Elements |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated structural design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for drilled piers should be model-based at this LOD, referencing the parameters of a specific, first class pier or column model object, whose measurements, both diameter and length, are quantifiable. Estimates for drilled piers should be inclusive of the pier drilling activity, casing (whether permanent or temporary), reinforcing (defined as #/LF or #/CY or defined by bar type in the structural narrative), and belled pier bottoms if applicable. Other information associated with the model element might include material strength (psi) of the material, and access or other constructability concerns. | |



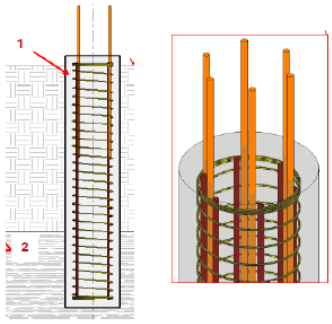

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Actual Top of Pier (TOP) and expected Bottom of Pier (BOP) modeled per engineer's review of site conditions.*
- *Foundation dowel locations and anchor rods, if applicable.*
- *Pier sizes are accurately modeled with interfaces to other systems such as but not limited to slab turn downs, key-ways between concrete pours, construction joints and reinforcing dowels into adjacent pours.*
- *Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD*

## A1010.30 21-01 10 10 30 Column Foundations (Deep Foundations) 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Column Foundations (Deep Foundations) - Drilled Piers | |
| **Uniformat 2 Category:** | A1010.30 | |
| **Omniclass Category:** | 21-01 10 10 30 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class pier/column object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Diameter of Pier (Inches)<br>Length of Pier (LF)<br>Top of Pier & Bottom of Pier Elevations | Pie Bell Sizes, If Applicable<br>Rebar Density as #/LF, #/CF or Other<br>Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Pier Drilling Activity<br>Pier Casing, If Applicable (Permanent or Temp)<br>Rebar/Reinforcing Steel | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Pier Accessories (Sleds, Bolster Chairs, etc.) |
| **Adjacent, Modeled Cost Elements** | Pier Caps<br>Concrete Columns<br>Foundation Walls | Other Foundation Elements |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated structural design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. In this case it would include fully detailed rebar, reinforcing steel, etc. | |



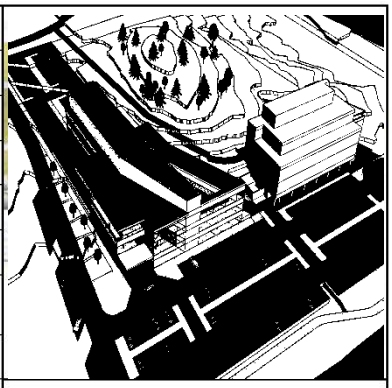

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Depth to bearing stratum*
- *Penetration into bearing stratum*
- *Locations of lap slices*
- *Rebar including hooks and lap splices*
- *Dowels*
- *Pier sled or pier wheel for side clear cover*
- *Pier bolster for bottom clear cover*
- *Pier modeling is developed to include all fabrication content that is part of the element*
- *Geotechnical regions are shown for context and not required to be modeled as part of this element at this LOD*
- *Peir sled, pier wheel, pier bolsters and other related items are not shown for clarity*

| Uniformat | Omniclass | Description | LOD |
|---|---|---|---|
| **A** | **21-01** | **SUBSTRUCTURE** | |
| A4010 | 21-01 40 10 | Standard Slab on Grade | 100 |

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Standard Slab on Grade | |
| **Uniformat 2 Category:** | A4010 | |
| **Omniclass Category:** | 21-01-40-10 | |
| **Example Use Case:** | Feasibility Study/Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred | |
| **Model Quantity Source Geometry:** | Volumetric Mass (Representing the Space Program) | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | Foundations<br>Superstructure | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the SOG is not typically identified at a detail level at this LOD. Cost for slabs at this LOD are often calculated on a $/GSF value being assigned to the component or system (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for model-inferred information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide model-informed values for foundation and slab on grade costs. | |



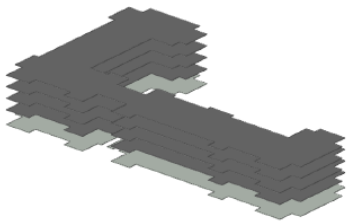
**LOD 100**

**BIM Forum LOD Specification Reference**

*Assumptions for slabs are included in other modeled elements such as volumetric mass or architectural floor elements that contain a layer for assumed structural framing depth.*

## A4010 21-01 40 10 Standard Slab on Grade 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Standard Slab on Grade | |
| **Uniformat 2 Category:** | A4010 | |
| **Omniclass Category:** | 21-01-40-10 | |
| **Example Use Case:** | Conceptual Design through Schematic Design | |
| **Model Quantity Origin:** | Model-Informed | |
| **Model Quantity Source Geometry:** | First-Class Ground-Level Slab Object (Native Object) Broken out "by Use" (Reference Omniclass Table 13) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Thickness (Inches), If Available | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Underslab Aggregate/Base Course<br>Pad Preparation Requirements | |
| **Adjacent, Modeled Cost Elements** | | |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the SOG, should be model-informed at this LOD, meaning costs are based on model parameters of a first-class slab model object (in this case the area of the ground level slab), and use a unit price appropriate for the project. The cost esimate should take into account any structural narrative information that may also support it. Slab costs should be specifically identified in Uniformat Category A40 as a $/SF value of slab with proper allowances reflecting the maturity of the design at this stage. | |



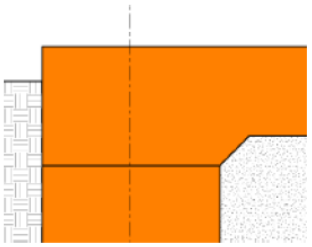
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Generic slab with approximate thickness*
- *Structural building grids for local project coordinate system are defined in model and coordinated with global civil coordinate system*

## A4010 21-01 40 10 Standard Slab on Grade 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Standard Slab on Grade | |
| **Uniformat 2 Category:** | A4010 | |
| **Omniclass Category:** | 21-01-40-10 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Ground-Level Slab Object (Native Object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Thickness (Inches), If Available | Rebar Density as #/SF or #/CF<br>Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Underslab Aggregate/Base Course | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Pad Preparation Requirements<br>Below Slab Insulation |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the SOG, should be model-based at this LOD, referencing parameters of a specific, first class slab model object, whose measurements, both area and volume, are quantifiable. Estimates for reinforcing might be identified and based on #/SF or #/CF as stated in structural narrative assumptions. Other assumptions associated with the model element might include material strength (psi) of the material, and other constructability concerns. | |



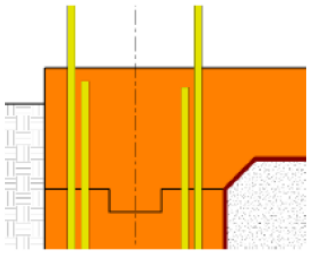
**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Overall size, thickness and geometry of the slab*
- *Major openings such as large mechanical elements modeled to nominal dimensions*
- *Slab depressions*
- *Edge turn downs*
- *Material strength*
- *Surfaces modeled to actual slopes*

## A4010 21-01 40 10 Standard Slab on Grade 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Standard Slab on Grade | |
| **Uniformat 2 Category:** | A4010 | |
| **Omniclass Category:** | 21-01-40-10 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Ground-Level Slab Object (Native Object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Thickness (Inches) | Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Underslab Aggregate/Base Course | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Pad Preparation Requirements<br>Below Slab Insulation |
| **Adjacent, Modeled Cost Elements** | Expansion Joints<br>Water Stops<br>Test | Void Boxes<br>Dowels |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level, including SOG, should be model-based, referencing a specific first-class slab model object, whose measurements, both area and volume are quantifiable. Estimates for reinforcing might be identified and based on #/SF or #/CF as stated in structural narrative assumptions as well as material strength (psi). Other quantifiable modeled aspects to support estimating could include expansion joints, control joints, pour joints, water stops, void boxes, and other constructability requirements. | |



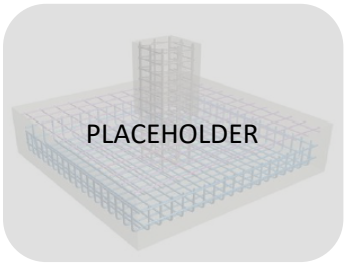
**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *All penetrations modeled to rough opening dimensions*
- *Pour joints (Per ACI - Construction Joints)*
- *Control joints*
- *Expansion joints*
- *Water stops*
- *Rebar and any embedded elements modeled at congested areas where specified by project BIMXP*
- *Void boxes*
- *Anchor rods*
- *Dowels*
- *Post-Tension profile and stands if required by BXP*

## A4010 21-01 40 10 Standard Slab on Grade 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Standard Slab on Grade | |
| **Uniformat 2 Category:** | A4010 | |
| **Omniclass Category:** | 21-01-40-10 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Ground-Level Slab Object (Native Object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Thickness (Inches) | Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Underslab Aggregate/Base Course | Concrete Delivery Method (Pump, Chute, Crane, etc.)<br>Pad Preparation Requirements<br>Below Slab Insulation |
| **Adjacent, Modeled Cost Elements** | Rebar/Reinforcing Steel<br>Expansion Joints<br>Water Stops | Void Boxes<br>Dowels<br>Below Slab Insulation |
| **Supporting Information:** | Any known information or stated project assumptions related to project or site conditions, substructure requirements, geotechnical report, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. In this case it would include fully detailed rebar, reinforcing steel, etc. | |



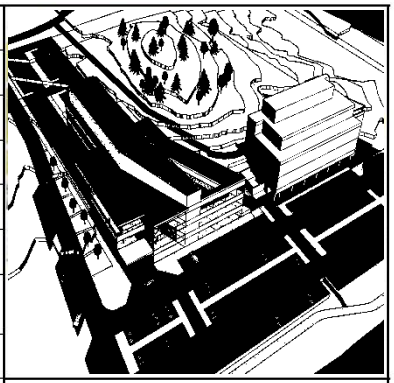

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Fully modeled rebar*
- *Actual slab dimensions and profiles with fully modeled rebar*
- *Post tensioning components*
- *All joints*
- *Waterproofing*
- *Finish*

| Uniformat | Omniclass | Description | LOD |
|---|---|---|---|
| **B** | **21-02 00 00** | **SHELL** | |
| B1010.10.10 | 21-02 10 10 10 10 | Floor Structural Frame (Concrete Columns) | 100 |

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Concrete Columns | |
| **Uniformat 2 Category:** | B1010.10.10 | |
| **Omniclass Category:** | 21-02 10 10 10 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | N/A at LOD 100 - See B1010.10.10 - Floor Structural Frame for this scope of work and LOD | |
| **Model Quantity Source Geometry:** | N/A at LOD 100 - See B1010.10.10 - Floor Structural Frame for this scope of work and LOD | |
| **Estimating-based Model Parameters & Properties:** | N/A | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | Floor Structural Frame | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade | |
| **Supporting Information:** | N/A | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for columns elements are not typically identified at a detailed level at this LOD. Cost for elevated slabs at this LOD are often calculated on a $/GSF value being assigned to the component or system (based on historical cost of similar type projects and other known information). | |



**LOD 100**

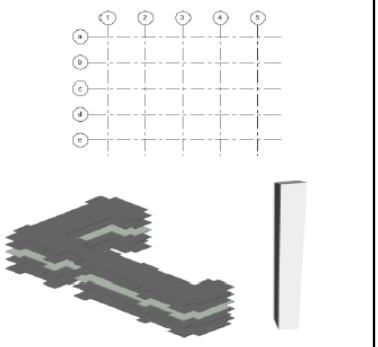
**BIM Forum LOD Specification Reference**

*Assumptions for structural framing are included in other modeled elements such as an architectural floor element that contains a layer for assumed structural framing depth or schematic structural elements that are not distinguishable by type or material.*

*Assembly depth/thickness or component size and locations are still flexible.*

## B1010.10.10 21-02 10 10 10 10 Floor Structural Frame (Concrete Columns) 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Concrete Columns | |
| **Uniformat 2 Category:** | B1010.10.10 | |
| **Omniclass Category:** | 21-02 10 10 10 | |
| **Example Use Case:** | Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred, Model-Informed, or Model-Based | |
| **Model Quantity Source Geometry:** | Use the slab object (native object) to infer column counts. Use structural gridlines/grid intersections if they can be counted parametrically to inform column counts. Use first class column objects if present to create model-based quantities. | |
| **Estimating-based Model Parameters & Properties:** | # of Grid Intersections by Structural or Arch Gridlines<br>Slab Area (SF)<br>Perimeter (LF) | Counts (EA)<br>Length (LF) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Horizontal Structural Elements (Slabs) | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade<br>Elevated Structural Slabs | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, anticipated slab type (flat plate, pan slab, other), etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for columns should at least be inferrable at this LOD, meaning costs are based on model parameters of a first-class slab model object (in this case, the area of an elevated slab, or a gridline system), and use a unit price appropriate for the project. However, if gridlines are present, indicating a preliminary structural grid, and can be quantified parametrically, then these should be used to inform column quantities. Last, if the model is developed enough and is utilizing first-class column model objects, then these should form the basis of the quantities. The cost should take into account any structural narrative information that may also support it including anticipated slab types (flat plate, pan slab, post-tension, etc.). | |



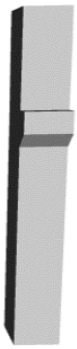
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Type of structural concrete system (e.g. cast-in-place or precast)*
*•Approximate geometry (e.g. depth) of structural elements*

## B1010.10.10 21-02 10 10 10 10 Floor Structural Frame (Concrete Columns) 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Concrete Columns | |
| **Uniformat 2 Category:** | B1010.10.10 | |
| **Omniclass Category:** | 21-02 10 10 10 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-class column objects (native object) | |
| **Estimating-based Model Parameters & Properties:** | Column Size - Width (IN)<br>Column Size - Length (LF)<br>Column Size - Volume (CY) | Rebar Density as #/LF or #/CF<br>Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade<br>Concrete Shear Walls<br>Elevated Structural Slabs | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for concrete columns should be model-based at this LOD, referencing parameters of a specific, first class column model object, whose measurements, both size, length, and volume, are quantifiable. Estimates for reinforcing might be identified narratively and based on #/LF or #/CF as stated in structural assumptions. Other assumptions associated with the model element might include material strength (psi) of the material, and other constructability concerns. | |



**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Specific sizes and locations of main concrete structural members modeled per defined structural grid with correct orientation.*
*•All sloping surfaces included in model element with exception of elements affected by manufacturer selection.*

## B1010.10.10 21-02 10 10 10 10 Floor Structural Frame (Concrete Columns) 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Concrete Columns | |
| **Uniformat 2 Category:** | B1010.10.10 | |
| **Omniclass Category:** | 21-02 10 10 10 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-class column object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Column Size - Width (IN)<br>Column Size - Length (LF)<br>Column Size - Volume (CY) | Rebar Density as #/LF or #/CF<br>Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade<br>Concrete Shear Walls<br>Elevated Structural Slabs | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level should be model-based at this LOD, referencing parameters of a specific first-class column model object, whose measurements, both size, length, and volume are quantifiable. Estimates for reinforcing might be identified and based on #/LF or #/CF as stated in structural narrative assumptions as well as material strength (psi). Other quantifiable modeled aspects to support estimating could include corbels, chamfers, pour joints, expansion joints, embeds and anchor rods, penetrations, and other constructability requirements. | |

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Reinforcement called out, modeled if required by the BXP, typically only in congested areas.*
- *Chamfer*
- *Pour joints and sequences to help identify reinforcing lap splice locations, scheduling, etc.*
- *Expansion joints*
- *Embeds and anchor rods*
- *Post-tension profile and strands modeled if required by the BXP*
- *Penetrations for items such as MEP*
- *Any permanent forming or shoring components*
- *Shear reinforcing and stud rails*

## B1010.10.10 21-02 10 10 10 10 Floor Structural Frame (Concrete Columns) 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Concrete Columns | |
| **Uniformat 2 Category:** | B1010.10.10 | |
| **Omniclass Category:** | 21-02 10 10 10 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-class elevated slab object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Column Size - Width (IN)<br>Column Size - Length (LF)<br>Column Size - Volume (CY) | Concrete Material Strength (PSI) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade<br>Concrete Shear Walls<br>Elevated Structural Slabs | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this LOD are assumed to be fully detailed, virtual representations of the actual, in-place element. In this case it would include fully detailed rebar, reinforcing steel, etc. | |

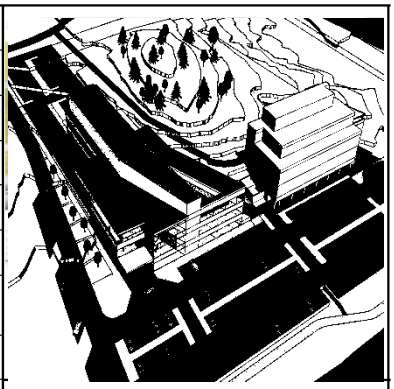
**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *All reinforcement including post tension elements detailed and modeled*
- *Finishes*

## B1010.10.10 21-02 10 10 10 10 Structural Frame (Concrete Superstructure) 100

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevated Superstructure - Floor Decks, Slabs, and Toppings - Concrete | |
| **Uniformat 2 Category:** | B1010.20.40 | |
| **Omniclass Category:** | 21-02 10 10 20 40 | |
| **Example Use Case:** | Feasibility Study/Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred | |
| **Model Quantity Source Geometry:** | Volumetric Mass (Representing the Space Program) | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | Foundations<br>Slab at Grade<br>Vertical Structural Elements (Columns/Shear Walls) | |
| **Adjacent, Modeled Cost Elements** | Building Envelope | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the elevated superstructure is not typically identified at a detailed level at this LOD. Cost for elevated slabs at this LOD are often calculated on a $/GSF value being assigned to the component as a system (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for *model-inferred* information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide *model-informed* values for superstructure costs. | |



**LOD 100**

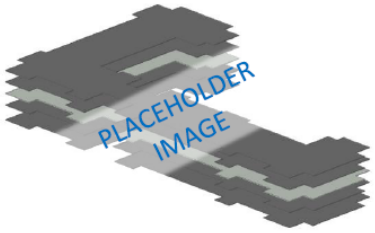
**BIM Forum LOD Specification Reference**

*Assumptions for structural framing are included in other modeled elements such as an architectural floor element that contains a layer for assumed structural framing depth or schematic structural elements that are not distinguishable by type or material.*

*Assembly depth/thickness or component size and locations are still flexible.*

## B1010.10.10 21-02 10 10 10 10 Structural Frame (Concrete Superstructure) 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevated Superstructure - Floor Decks, Slabs, and Toppings - Concrete | |
| **Uniformat 2 Category:** | B1010.20.40 | |
| **Omniclass Category:** | 21-02 10 10 20 40 | |
| **Example Use Case:** | Conceptual Design through Schematic Design | |
| **Model Quantity Origin:** | Model-Informed | |
| **Model Quantity Source Geometry:** | First-class elevated slab object (native object) broken out "by use" (Reference Omniclass Table 13) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Thickness (Inches), if available | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Vertical Structural Elements (Columns/Shear Walls)<br>Roof Structure, if applicable | |
| **Adjacent, Modeled Cost Elements** | Slab at Grade<br>Roof Structure, if applicable<br>Building Envelope | Roof Covering |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, anticipated slab type (flat plate, pan slab, other), etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for elevated slabs should be at least model-informed at this LOD, meaning costs are based on model parameters of a first-class slab model object (in this case, the area of an elevated slab), and use a unit price appropriate for the project. The cost should take into account any structural narrative information that may also support it including anticipated slab types (flat plate, pan slab, post-tension, etc.). Elevated slab costs should be specifically identified in Uniformat Category B10 as a $/SF value of slab with proper allowances reflecting the maturity of the design at this stage. | |



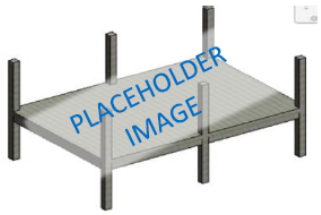

**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Type of structural concrete system (e.g. cast-in-place or precast)*
*•Approximate geometry (e.g. depth) of structural elements*

## B1010.10.10 21-02 10 10 10 10 Structural Frame (Concrete Superstructure) 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevated Superstructure - Floor Decks, Slabs, and Toppings - Concrete | |
| **Uniformat 2 Category:** | B1010.20.40 | |
| **Omniclass Category:** | 21-02 10 10 20 40 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class elevated slab object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Volume (CF or CY) | Rebar Density as #/SF or #/CF<br>Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Concrete Columns<br>Concrete Shear Walls<br>Building Envelope | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for elevated concrete slabs should be model-based at this LOD, referencing parameters of a specific, first class slab model object, whose measurements, both area and volume, are quantifiable. Estimates for reinforcing might be identified narratively and based on #/SF or #/CF as stated in structural assumptions. Other assumptions associated with the model element might include material strength (psi) of the material, and other constructability concerns. | |




**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Specific sizes and locations of main concrete structural members modeled per defined structural grid with correct orientation.*
*•All sloping surfaces included in model element with exception of elements affected by manufacturer selection.*

## B1010.10.10 21-02 10 10 10 10 Structural Frame (Concrete Superstructure) 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevated Superstructure - Floor Decks, Slabs, and Toppings - Concrete | |
| **Uniformat 2 Category:** | B1010.20.40 | |
| **Omniclass Category:** | 21-02 10 10 20 40 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-class elevated slab object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Volume (CF or CY) | Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Concrete Columns<br>Concrete Shear Walls<br>Building Envelope | Expansion Joints<br>Water Stops |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level should be model-based at this LOD, referencing parameters of a specific first-class slab model object, whose measurements, both area and volume are quantifiable. Estimates for reinforcing might be identified and based on #/SF or #/CF as stated in structural narrative assumptions as well as material strength (psi). Other quantifiable modeled aspects to support estimating could include expansion joints, control joints, pour joints, water stops, and other constructability requirements. | |

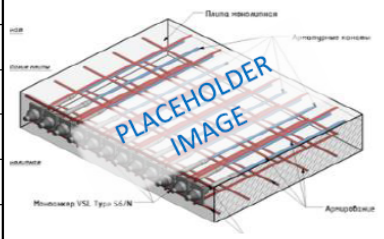

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Reinforcement called out, modeled if required by the BXP, typically only in congested areas.*
*•Chamfer*
*•Pour joints and sequences to help identify reinforcing lap splice locations, scheduling, etc.*
*•Expansion joints*
*•Embeds and anchor rods*
*•Post-tension profile and strands modeled if required by the BXP*
*•Penetrations for items such as MEP*
*•Any permanent forming or shoring components*
*•Shear reinforcing and stud rails*

## B1010.10.10 21-02 10 10 10 10 Structural Frame (Concrete Superstructure) 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevated Superstructure - Floor Decks, Slabs, and Toppings - Concrete | |
| **Uniformat 2 Category:** | B1010.20.40 | |
| **Omniclass Category:** | 21-02 10 10 20 40 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-class elevated slab object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Slab Area (SF)<br>Perimeter (LF)<br>Slab Volume (CF or CY) | Concrete Material Strength (PSI)<br>Surface Regularity Specification (Ff/Fl or Fmin) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Formwork<br>Rebar/Reinforcing Steel<br>Concrete Delivery Method (Pump, Chute, Crane, etc.) | |
| **Adjacent, Modeled Cost Elements** | Concrete Columns<br>Concrete Shear Walls<br>Building Envelope | Expansion Joints<br>Water Stops |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as superstructure requirements, structural load information, stated design assumptions, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this LOD are assumed to be fully detailed, virtual representations of the actual, in-place element. In this case it would include fully detailed rebar, reinforcing steel, etc. | |



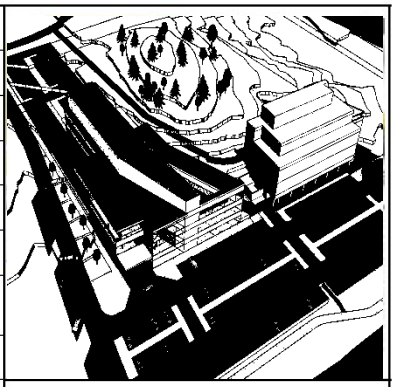

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• All reinforcement including post tension elements detailed and modeled*
*•Finishes*

## B2010 21-02 20 10 Exterior Walls 100

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Exterior Walls | |
| **Uniformat 2 Category:** | B2010 | |
| **Omniclass Category:** | 21-02 20 10 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred | |
| **Model Quantity Source Geometry:** | Use the volumetric Mass (Representing the Space Program) to infer exterior envelope cost from GSF values. | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | Exterior Wall Backup Construction<br>Exterior Wall Veneer Finishes<br>Exterior Openings | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for exterior envelope construction may not be identified at a detailed level at this LOD. Cost for exterior envelope construction are often calculated on a $/GSF value being assigned to the component or system (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for model-inferred information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide model-informed values for exterior envelope assumptions and cost. | |



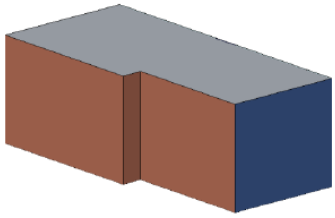
**LOD 100**

**BIM Forum LOD Specification Reference**

*Solid mass model representing overall building volume; or, schematic wall elements that are not distinguishable by type or material. Assembly depth/thickness and locations still flexible.*

## B2010 21-02 20 10 Exterior Walls 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Exterior Walls | |
| **Uniformat 2 Category:** | B2010 | |
| **Omniclass Category:** | 21-02 20 10 | |
| **Example Use Case:** | Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Informed | |
| **Model Quantity Source Geometry:** | First-class, but generic wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Area (Vertical Surface Area) - (SF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Exterior Wall Backup Construction<br>Exterior Wall Veneer Finishes<br>Exterior Openings & Doors | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as backup wall construction assumptions, % of wall finishes broken out by materiality, % of openings, and other non-modeled elements. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the exterior envelope should be model-informed at this LOD, meaning it is based on parameters of a first class model object (in this case the area of a generic wall object), and using a unit price appropriate for the project. While the model can be constructed as a composite object without separately identifiable layers, the cost estimate should take into account backup construction types, finish veneers, window and door openings, based on percentages, and allowances for other non-modeled exterior features such as eyebrows and other canopies, overhangs, etc. Exterior envelope costs should be specifically identified in Uniformat Category B20 and captured as either a $/SF value of the exterior envelope wall area with proper allowances reflecting the maturity of the design at this stage. | |



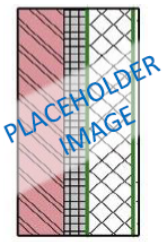
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Generic wall objects separated by type of material (e.g. brick wall vs. terracotta)*
- *Approximate overall wall thickness represented by a single assembly*
- *Layouts and locations still flexible*

## B2010 21-02 20 10 Exterior Walls 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Exterior Walls | |
| **Uniformat 2 Category:** | B2010 | |
| **Omniclass Category:** | 21-02 20 10 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Backup Construction System/Material<br>Wall Finish Veneer System/Material<br>Wall Area (Vertical Surface Area) - (SF) | Wall Thickness (Inches) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Exterior Wall Backup Construction<br>Exterior Wall Veneer Finishes<br>Supporting Structural Elements | |
| **Adjacent, Modeled Cost Elements** | Exterior Opening Elements (Windows/Doors) | |
| **Supporting Information:** | Any known information or stated project assumptions related to project that would support the exterior envelope estimating activities. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the exterior envelope individual components (backup sytems and finish systems) should be model-based at this LOD, referencing the parameters of specific, first class wall and finish system model objects, whose measurements (wall area) are quantifiable. It is highly recommended to model finish systems as separate objects from backup wall construction systems to better support model-based workflows, as opposed to composite objects. Estimates for exterior envelope should be inclusive of the backup system, the finish system, supporting elements, and access or other constructability concerns. | |



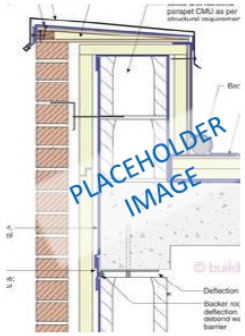

**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Exterior wall veneer modeled as a separate element and modeled to actual dimensions*
- *Backup construction modeled as a specific wall modeled to actual dimensions*
- *Penetrations are modeled to nominal dimensions for major wall openings such as windows, doors, and large mechanical elements*

## B2010 21-02 20 10 Exterior Walls 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Exterior Walls | |
| **Uniformat 2 Category:** | B2010 | |
| **Omniclass Category:** | 21-02 20 10 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Backup Construction System/Material<br>Wall Finish Veneer System/Material<br>Wall Area (Vertical Surface Area) - (SF | Wall Thickness (Inches) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Exterior Wall Backup Construction<br>Exterior Wall Veneer Finishes<br>Supporting Structural Elements | |
| **Adjacent, Modeled Cost Elements** | Exterior Opening Elements (Windows/Doors) | |
| **Supporting Information:** | Any known information or stated project assumptions related to project that would support the exterior envelope estimating activities. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the exterior envelope individual components (backup sytems and finish systems) should be model-based at this LOD, referencing the parameters of specific, first class wall and finish system model objects, whose measurements (wall area) are quantifiable. It is highly recommended to model finish systems as separate objects from backup wall construction systems to better support model-based workflows, as opposed to composite objects. Estimates for exterior envelope should be inclusive of the backup system, the finish system, supporting elements, and access or other constructability concerns. | |



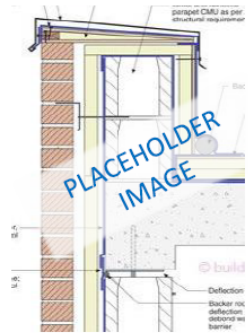

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Exterior wall veneer modeled as a separate element*
- *Backup construction modeled as a specific wall modeled to actual dimensions*
- *All penetrations are modeled at actual rough-opening dimensions*
- *Precast concrete panels are individually modeled. Connection points are specified.*
- *Connection to interfacing systems*

## B2010 21-02 20 10 Exterior Walls 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Exterior Walls | |
| **Uniformat 2 Category:** | B2010 | |
| **Omniclass Category:** | 21-02 20 10 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Backup Construction System/Material<br>Wall Finish Veneer System/Material<br>Wall Area (Vertical Surface Area) - (SF | Wall Thickness (Inches) |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Exterior Wall Backup Construction<br>Exterior Wall Veneer Finishes<br>Supporting Structural Elements | |
| **Adjacent, Modeled Cost Elements** | Exterior Opening Elements (Windows/Doors) | |
| **Supporting Information:** | Any known information or stated project assumptions related to project that would support the exterior envelope estimating activities. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. | |



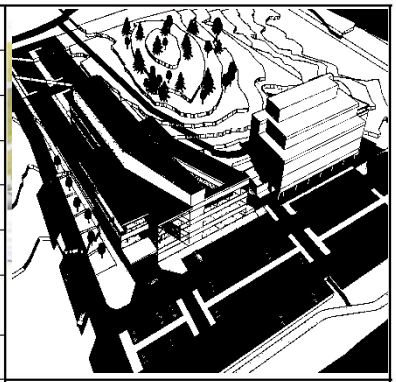

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Studs and tracks*
- *Individual masonry units*
- *Reinforcing*
- *Sheathing*
- *Insulation*
- *Other skin layers*
- *Weep holes*

## B3010 21-02 30 10 Roofing 100

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Roofing | |
| **Uniformat 2 Category:** | B3010 | |
| **Omniclass Category:** | 21-02 30 10 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred | |
| **Model Quantity Source Geometry:** | Use the volumetric Mass (Representing the Space Program) to infer roofing cost from GSF values. | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | N/A | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for roofing construction may not be identified at a detail level at this LOD. Cost for roofing construction are often calculated on a $/GSF value being assigned to the component or system (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for model-inferred information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide model-informed values for exterior envelope assumptions and cost. | |



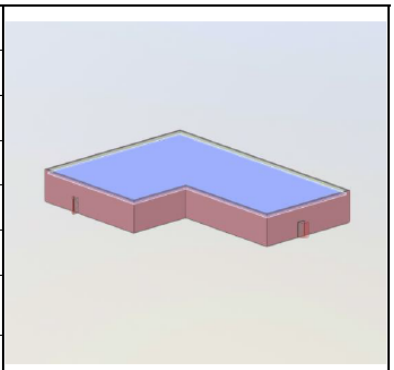
**LOD 100**

**BIM Forum LOD Specification Reference**

*Solid mass model representing overall building volume; or, schematic wall elements that are not distinguishable by type or material. Assembly depth/thickness and locations still flexible.*

## B3010 21-02 30 10 Roofing 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Roofing | |
| **Uniformat 2 Category:** | B3010 | |
| **Omniclass Category:** | 21-02 30 10 | |
| **Example Use Case:** | Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Informed or Model-Based | |
| **Model Quantity Source Geometry:** | First-class, but generic roof slab object (native object) or roof covering object. | |
| **Estimating-based Model Parameters & Properties:** | Area (SF)<br>Perimeter (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Roof Flashing<br>Roof Accessories | |
| **Adjacent, Modeled Cost Elements** | Roof Structural Construction | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as roof construction assumptions, roof material type, and other non-modeled elements. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the roofing system should be at least model-informed at this LOD, meaning it is based on parameters of a first class model object (in this case the area of a generic roof object), and using a unit price appropriate for the project. While the element can be constructed as a composite object without separately identifiable layers, the cost estimate should take into account the roofing system as a whole, and make allowances for the parts and pieces of the system, and other non-modeled exterior features. Roofing costs should be specifically identified in Uniformat Category B30 and captured as either a $/SF value of the roof area with proper allowances reflecting the maturity of the design at this stage. | |



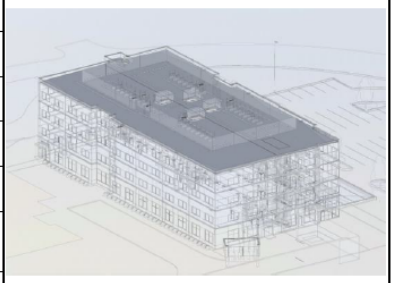
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Generic element representing roof exterior skin.*

## B3010 21-02 30 10 Roofing 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Roofing | |
| **Uniformat 2 Category:** | B3010 | |
| **Omniclass Category:** | 21-02 30 10 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class roof object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Roof Construction System/Material<br>Area (SF)<br>Perimeter (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Roof Flashing<br>Roof Accessories<br>Roof Crickets | Roof Slope |
| **Adjacent, Modeled Cost Elements** | Roof Structural Construction | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as roof construction assumptions, roof material type, and other non-modeled elements. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the roofing system should be model-based at this LOD, meaning it is based on parameters of a first class model object (in this case proper roof object). The element should be modeled with separate, identifiable layers for the parts and pieces of the system. Roofing costs should be specifically identified in Uniformat Category B30 and captured as appropriate $/UOM value reflecting the maturity of the design at this stage. | |



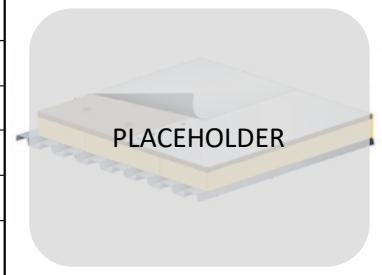
**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Specific element representing roof insulation and exterior skin modeled to actual dimensions.*
- *Surface slopes (e.g. tapered insulation) are modeled to actual dimensions.*
- *Penetrations are modeled to nominal dimensions for major wall openings such as skylights, and large mechnical elements.*

## B3010 21-02 30 10 Roofing 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Roofing | |
| **Uniformat 2 Category:** | B3010 | |
| **Omniclass Category:** | 21-02 30 10 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Roof Construction System/Material<br>Area (SF)<br>Perimeter (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Roof Flashing<br>Roof Accessories<br>Roof Crickets | Roof Slope |
| **Adjacent, Modeled Cost Elements** | Roof Structural Construction | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as roof construction assumptions, roof material type, and other non-modeled elements. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the roofing systems individual components (underlayment, roof sheeting, flashing, coping cap, etc) should be model-based at this LOD, referencing the parameters of specific, first class roof system model objects, whose measurements (wall area) are quantifiable. It is highly recommended to model roof systems as separate objects from roof stucture to better support model-based workflows, as opposed to composite objects. Estimates for roofing systems should be inclusive of the primary parts and pieces, supporting elements, and access or other constructability concerns. | |



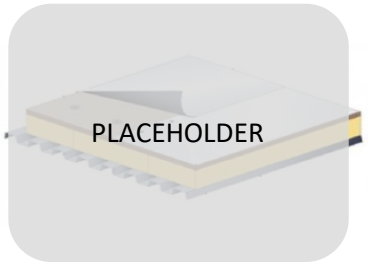

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *All pendetrations are modeled at actual rough-opening dimensions.*
- *Flashing*

B3010 21-02 30 10 Roofing 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Roofing | |
| **Uniformat 2 Category:** | B3010 | |
| **Omniclass Category:** | 21-02 30 10 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Roof Construction System/Material<br>Area (SF)<br>Perimeter (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Roof Flashing<br>Roof Accessories<br>Roof Crickets | Roof Slope |
| **Adjacent, Modeled Cost Elements** | Roof Structural Construction | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as roof construction assumptions, roof material type, and other non-modeled elements. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for structural elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. | |



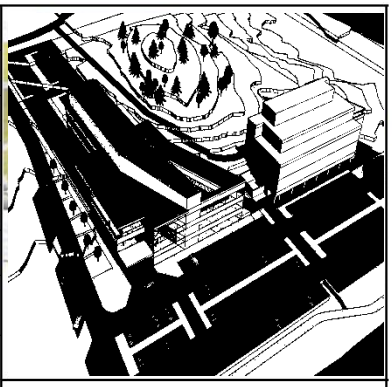

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*

| Uniformat | Omniclass | Description | LOD |
|---|---|---|---|
| **C** | **21-03** | **INTERIORS** | |
| C1010.10.20 | 21-03 10 10 10 20 | Interior Wall (Cold-Form Metal Framing) | 100 |

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Interior Wall Framing (Cold-Form Metal Framing) | |
| **Uniformat 2 Category:** | C1010.10.20 | |
| **Omniclass Category:** | 21-03 10 10 10 20 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | N/A at LOD 100 - See C3010 - Interior Finishes for this scope of work and LOD | |
| **Model Quantity Source Geometry:** | N/A at LOD 100 - See C3010 - Interior Finishes for this scope of work and LOD | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | N/A | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for interior construction may not be identified at a detail level at this LOD. Cost for interior construction are often calculated on a $/GSF value being assigned to the interior construction and finishes system as a whole (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for model-inferred information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide model-informed values for exterior envelope assumptions and cost. | |



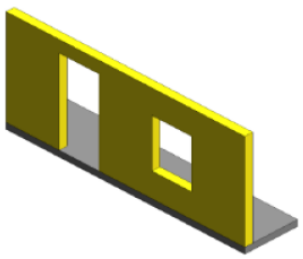
**LOD 100**

**BIM Forum LOD Specification Reference**

*A schematic model element or symbol that is not distinguishable by type or material.*

## C1010.10.20 21-03 10 10 10 20 Interior Wall (Cold-Form Metal Framing) 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Interior Wall Framing (Cold-Form Metal Framing) | |
| **Uniformat 2 Category:** | C1010.10.20 | |
| **Omniclass Category:** | 21-03 10 10 10 20 | |
| **Example Use Case:** | Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Informed or Model-Based | |
| **Model Quantity Source Geometry:** | First-class, but generic wall object (native object). | |
| **Estimating-based Model Parameters & Properties:** | Wall Surface Area (SF)<br>Length of Wall (LF)<br>Height of Wall (LF) | Wall Type |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Wall Framing<br>Wall Support Systems | |
| **Adjacent, Modeled Cost Elements** | Wall Finish Materials | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as interior construction assumptions such as wall type. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the interior partition system should be at least model-informed at this LOD, meaning it is based on parameters of a first class model object (in this case the wall area (surface area) of a generic wall object), and using a unit price appropriate for the componen or system. While the element can be constructed as a composite object without separately identifiable layers, the cost estimate should take into account the components of the wall system as a whole, and make appropriate allowances for the parts and pieces of the system, and other non-modeled exterior features. Interior construction costs should be specifically identified in Uniformat Category C10 and captured as either a $/SF value of the wall surface area with proper allowances reflecting the maturity of the design at this stage. | |



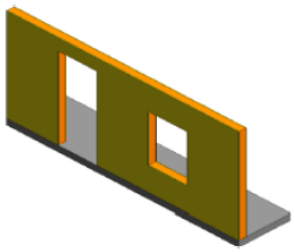
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Generic wall objects separated by type of material (e.g. Gypsum board vs masonry).*
*• Approximate overall wall thickness represented by a single assembly.*
*• Layouts, locations, heights, and elevation profiles are still flexible.*

## C1010.10.20 21-03 10 10 10 20 Interior Wall (Cold-Form Metal Framing) 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Interior Wall Framing (Cold-Form Metal Framing) | |
| **Uniformat 2 Category:** | C1010.10.20 | |
| **Omniclass Category:** | 21-03 10 10 10 20 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class roof object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Surface Area (SF)<br>Length of Wall (LF)<br>Height of Wall (LF) | Wall Type |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Wall Framing<br>Wall Support Systems | |
| **Adjacent, Modeled Cost Elements** | Wall Finish Materials | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as interior construction assumptions such as wall type. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the interior partition framing system should be model-based at this LOD, meaning it is based on parameters of a first class model object (in this case proper wall object). The element should be modeled with separate, identifiable layers for the parts and pieces of the system, i.e. framing, sheathing, insulation, finishes, etc.. Interior framing costs should be specifically identified in Uniformat Category C10 and captured as appropriate $/UOM value reflecting the maturity of the design at this stage. | |



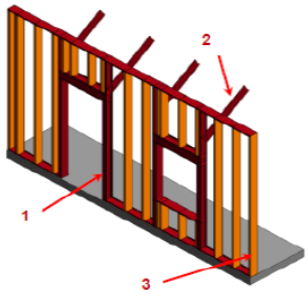
**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Composite model assembly by type with overall thickness that accounts for framing and finish specified for the wall system.*
*• Wall elements are modeled to specific layouts, locations, heights, and elevation profiles. Penetrations are modeled to nominal dimensions for major wall openings such as windows, doors, and large mechanical elements.*
*• Penetrations are modeled to nominal dimensions for major wall openings such as skylights, and large mechnical elements.*

## C1010.10.20 21-03 10 10 10 20 Interior Wall (Cold-Form Metal Framing) 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Interior Wall Framing (Cold-Form Metal Framing) | |
| **Uniformat 2 Category:** | C1010.10.20 | |
| **Omniclass Category:** | 21-03 10 10 10 20 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Surface Area (SF)<br>Length of Wall (LF)<br>Height of Wall (LF) | Wall Type |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Wall Framing<br>Wall Support Systems | |
| **Adjacent, Modeled Cost Elements** | Wall Finish Materials | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as interior construction assumptions such as wall type. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the interior partition framing system should be model-based at this LOD, meaning it is based on parameters of a first class model object (in this case proper wall object). The element should be modeled with separate, identifiable layers for the parts and pieces of the system, i.e. framing, sheathing, insulation, finishes, etc.. Interior framing costs should be specifically identified in Uniformat Category C10 and captured as appropriate $/UOM value reflecting the maturity of the design at this stage. | |



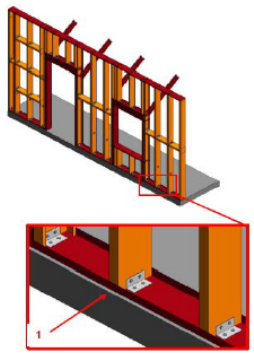

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Cold formed metal framing is developed with sufficient elements to support detailed interface coordination with other systyems such as MEP.*
*• All penetrations are modeled at actual rough-opening dimensions.*

## C1010.10.20 21-03 10 10 10 20 Interior Wall (Cold-Form Metal Framing) 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Interior Wall Framing (Cold-Form Metal Framing) | |
| **Uniformat 2 Category:** | C1010.10.20 | |
| **Omniclass Category:** | 21-03 10 10 10 20 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class wall object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Wall Surface Area (SF)<br>Length of Wall (LF)<br>Height of Wall (LF) | Wall Type |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | Materials and Finishes - Material Name |
| **Correlated Cost and Scope Items:** | Wall Framing<br>Wall Support Systems | |
| **Adjacent, Modeled Cost Elements** | Wall Finish Materials | |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as interior construction assumptions such as wall type. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for interior partition elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. | |



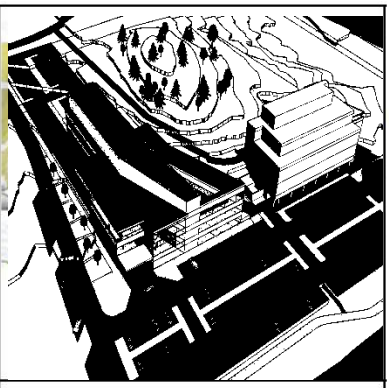

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Cold formed metal framing is developed with sufficient elements that support the fabrication of the CFMF system.*

| Uniformat | Omniclass | Description | LOD |
|---|---|---|---|
| **D** | **21-04** | **SERVICES** | |
| D1010.10 | 21-04 10 10 10 | Elevators | 100 |

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevators | |
| **Uniformat 2 Category:** | D1010.10 | |
| **Omniclass Category:** | 21-04 10 10 10 | |
| **Example Use Case:** | Feasibility Study or Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Inferred | |
| **Model Quantity Source Geometry:** | Volumetric Mass (Representing the Space Program) | |
| **Estimating-based Model Parameters & Properties:** | NSF + Gross-Up Factor<br>Project GSF | |
| **Identification-based Model Parameters & Properties:** | N/A | |
| **Correlated Cost and Scope Items:** | N/A | |
| **Adjacent, Modeled Cost Elements** | N/A | |
| **Supporting Information:** | Any known information or stated project assumptions related to project. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for elevators may not be identified at a detail level at this LOD. Cost for elevators are often calculated on a $/GSF value being assigned to the conveying system as a whole (based on historical cost of similar type projects and other known information). However, when a space program for a project is modeled as three-dimensional volumes, it is possible to link cost values to geometry in order to calculate cost/SF based on the aggregate GSF of the program. This can serve as the basis for model-inferred information.<br><br>Alternatively, an early conceptual design model might also be developed at this stage which could begin to provide model-informed values for elevator assumptions and cost. | |



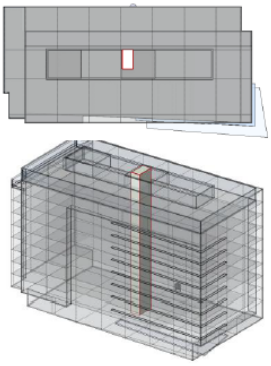
**LOD 100**

**BIM Forum LOD Specification Reference**

*A schematic model element or symbol that is not distinguishable by type or material.*

## D1010.10 21-04 10 10 10 Elevators 200

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevators | |
| **Uniformat 2 Category:** | D1010.10 | |
| **Omniclass Category:** | 21-04 10 10 10 | |
| **Example Use Case:** | Conceptual Design Phase | |
| **Model Quantity Origin:** | Model-Informed or Model-Based | |
| **Model Quantity Source Geometry:** | Generic model object | |
| **Estimating-based Model Parameters & Properties:** | Number of Stops (EA)<br>Number of Cabs (EA)<br>Overall Travel Height (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | |
| **Correlated Cost and Scope Items:** | Cab Finishes | |
| **Adjacent, Modeled Cost Elements** | Shaft Wall Construction<br>Shat Wall Finishes<br>Elevator Pit | Elevator Machine Room |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as elevator type, speed, capacity, etc. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for elevators should be at least model-informed at this LOD, meaning it is based on parameters of a generic model object (in this case a vertical shaft element indicating approximate location and path of travel), and using a unit price appropriate for the system, likely $/Stop/Cab. The cost estimate should take into account the components of the elevator system as a whole, but make appropriate allowances for the parts and pieces of the system, such as the elevator cab finishes, guide rails, separator beams, hoist beam, and other non-modeled exterior features. Elevator costs should be specifically identified in Uniformat Category D10 and captured as either a $/Stop/Cab value or as Each $/EA, with proper allowances reflecting the maturity of the design at this stage. | |



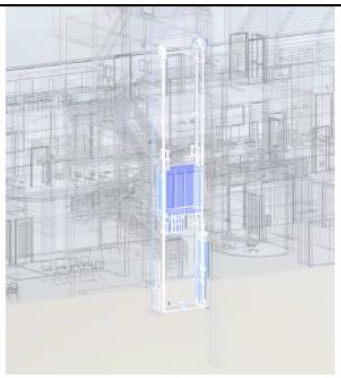
**LOD 200**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Generic representations of the system envelope, including critical path of travel zones.*

## D1010.10 21-04 10 10 10 Elevators 300

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevators | |
| **Uniformat 2 Category:** | D1010.10 | |
| **Omniclass Category:** | 21-04 10 10 10 | |
| **Example Use Case:** | Schematic Design through Design Development | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Elevator Equipment Object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Number of Stops (EA)<br>Overall Travel Height (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | |
| **Correlated Cost and Scope Items:** | Cab Finishes | |
| **Adjacent, Modeled Cost Elements** | Shaft Wall Construction<br>Shat Wall Finishes<br>Elevator Pit | Elevator Machine Room |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as elevator type, speed, capacity, etc.. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the elevator system should be model-based at this LOD, meaning it is reflecting the specific project conditions and represented by a first class model object (in this case an elevator object). The element should be modeled as a composite, representative object, not with separate, identifiable layers for the parts and pieces of the system, i.e. separator rails, hoist beam, mechanical equipment, cab, etc. Elevator costs should be specifically identified in Uniformat Category D10 and captured as appropriate $/UOM value reflecting the maturity of the design at this stage. | |



**LOD 300**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
*• Specific system elements modeled by type, including all path of travel zones*
*• Pits and/or control rooms and associated equipment to be modeled if applicable*
*• Major structural support elements modeled*
*• Connections to mechanical or electrical services*

## D1010.10 21-04 10 10 10 Elevators 350

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevators | |
| **Uniformat 2 Category:** | D1010.10 | |
| **Omniclass Category:** | 21-04 10 10 10 | |
| **Example Use Case:** | Design Development through Construction Documents | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Elevator Object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Number of Stops (EA)<br>Overall Travel Height (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | |
| **Correlated Cost and Scope Items:** | Cab Finishes | |
| **Adjacent, Modeled Cost Elements** | Shaft Wall Construction<br>Shat Wall Finishes<br>Elevator Pit | Elevator Machine Room |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as elevator type, speed, capacity, etc.. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for the elevator system should be model-based at this LOD, meaning it is reflecting the specific project conditions and represented by a first class model object (in this case an elevator object). The element can be modeled as a composite, representative object, or with separate, identifiable layers for the parts and pieces of the system, i.e. separator rails, hoist beam, mechanical equipment, cab, etc. Elevator costs should be specifically identified in Uniformat Category D10 and captured as appropriate $/UOM value reflecting the maturity of the design at this stage. | |

**LOD 350**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *Sizing adjusted to the actual manufacturer specifications.*
- *Guiding tracks/rails*
- *Service/access zones*

## D1010.10 21-04 10 10 10 Elevators 400

| | | |
|---|---|---|
| **Primary Cost Element/Scope Item:** | Elevators | |
| **Uniformat 2 Category:** | D1010.10 | |
| **Omniclass Category:** | 21-04 10 10 10 | |
| **Example Use Case:** | Shop Drawings or Fabrication Drawings | |
| **Model Quantity Origin:** | Model-Based | |
| **Model Quantity Source Geometry:** | First-Class Elevator Object (native object) | |
| **Estimating-based Model Parameters & Properties:** | Number of Stops (EA)<br>Overall Travel Height (LF) | |
| **Identification-based Model Parameters & Properties:** | Assembly Code - Uniformat Classification<br>Identity Data - Type Name | |
| **Correlated Cost and Scope Items:** | Cab Finishes | |
| **Adjacent, Modeled Cost Elements** | Shaft Wall Construction<br>Shat Wall Finishes<br>Elevator Pit | Elevator Machine Room |
| **Supporting Information:** | Any known information or stated project assumptions related to project such as interior construction assumptions such as wall type. | |
| **Project Meta Data:** | Omniclass Table 11 - Level 3 Project Type Designation | |
| **Cost Estimating Guidelines:** | Cost for interior partition elements at this level are assumed to be fully detailed, virtual representations of the actual, in-place element. | |

**LOD 400**

**BIM Forum LOD Specification Reference**

*Element modeling to include:*
- *All connections, supports, framing, and other supplementary components.*

-End of Document