



SJI BIM Guidance

The following document was developed to assist owners, contractors, erectors, fabricators, and specifying professionals with Building Information Modeling (BIM) guidance regarding the use of Steel Joists through an SJI member manufacturer. This document is NOT intended to be all-inclusive BIM specification or to cover the full capabilities of each SJI member company. Rather it should be used as guidance for discussions with SJI member companies and/or to formulate BIM Execution Plans (BIMXP) based on the below comments provided by the SJI.

SJI BIM Guidance has provided comments and insight into the BIMForum's *Level of Development (LOD) Specification Version: 2013* that was released August 20th, 2013, as well as items to consider when utilizing Steel Joists in a 3D model. This document will attempt to maintain updates within appropriate time frames as the BIMForum's LOD is updated and as the industry continues to move forward with BIM.

Please note: The below LOD items were taken directly from the BIMForum's *Level of Development (LOD) Specification 2013* for ease of reference with regard to the comments made pertaining to Steel Joists. Additional information may be found in the full document that is available via the BIMForum website (www.bimforum.org/lof). The BIMForum's *Level of Development Specification 2013* was developed in conjunction with the American Institute of Architects (AIA) and the Association of General Contractors (AGC).

Below you will find the definitions listed for each LOD and the correlated LOD information table for B1010.10 – Floor Structural Frame (Steel Joists) as defined by the BIMForum. Comments by the SJI have been provided at each level that we feel may pertain to the current Steel Joist specification process and resultant model and non-graphic information that is provided by an SJI member manufacturer. Again this is general guidance and discussions with specific SJI member manufacturers may be needed.

- **LOD 100** *The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.*
- **LOD 200** *The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.*
- **LOD 300** *The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.*
 - **SJI COMMENT:** The SJI considers this level to be the specification level or Engineer of Record (EOR) LOD. This information is typically provided by the EOR via the Contract Drawing (CD) phase (possibly utilizing a BIM program to create the CD's.). Due to the specification models limited ability at this time to provide full CD information required to properly design and detail steel joists, the SJI still considers CD's a requirement to communicate design intent although they may be supplemented with 3D model information.
- **LOD 350** *The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, orientation, and interfaces with other building systems. Non-graphic information may also be attached to the Model Element.*
 - **SJI COMMENT:** The SJI considers this the Steel Joist Manufacturer LOD; typical information provided by Joist/Deck Manufacturer during Approval Drawings and Final Erection Drawings. Due to limitations within modeling software some information will still be provided via Erection Drawings and Calculation sheets. Also, some modeling, details, and non-graphic information falls outside the scope of a single manufacturer for a floor/roof system, thus additional LOD 350 models or coordination between trades will be required. (ex. Joist modeling data from joist manufacturer and Fire proofing modeling data from contracted fire proofer).
- **LOD 400** *The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.*
 - **SJI COMMENT:** The SJI believes that all information provided will either be provided in conjunction with LOD 350 and related limitation comments or falls outside the scope and will be included in additional models by others.
- **LOD 500** *The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.*

Please find the below chart from section B1010.10 for additional comments regarding SJI Steel Joists in BIM as they relate to current stated guidelines by the BIMForum's LOD Specification.



B1010.10 – Floor Structural Frame (Steel Joists).

100	See B10	
200	<p>Element modeling to include:</p> <ul style="list-style-type: none"> Approximate depth 	
300	<p>Element modeling to include:</p> <ul style="list-style-type: none"> Joist size, depth, slope, and material Spacing and end elevations Joist seat depth <p>Required non-graphic information associated with model elements includes:</p> <ul style="list-style-type: none"> Non-standard joist seat depths and/or sloping joist seat Member designation, load capacity and deflection criteria Design loads and location of concentrated loads Material requirements 	<p>EOR specified info comments:</p> <ul style="list-style-type: none"> Required non-graphic information comments. <ul style="list-style-type: none"> Most specification information is not available in current BIM software and will need to be coordinated via User Defined Attributes (UDA's) in the model or Contract Drawings. Design loads as well as locations are undergoing development through the AISC's ongoing effort to increase interoperability through a common file format. Thus should be communicated via Contract Drawings and tables.
350	<p>Element modeling to include, information needed for cross trade collaboration such as:</p> <ul style="list-style-type: none"> Actual final joist profile locations with accurate panel points Joist bridging and lateral braces. Fire protection coating Any miscellaneous steel pertaining to the joist Joist seat width Erection details for installation Chord and web member section profiles are defined Joist layout in coordination with metal deck fasteners would be confirmed Non-standard joist seat depths and/or sloping joist seat 	<p>Joist Manufacturer specified info comments:</p> <ul style="list-style-type: none"> Approval Joist models may be considered for LOD 350, however changes to design loading may alter angle sizes and web locations at Final Joist design. Fire Protection coating will not be modeled in Joist Manufacturers model. Misc. Steel 'By Others' will not be modeled in Joist Manufacturers model, but should be coordinated with Steel Fabricators model. Erection dwgs for Joist and Bridging will be provided by Joist Manufacturer in conj. With joist and bridging model. However, connection to support details by EOR will be provided by the EOR or steel fabricator. Chord and web member sizes provided in a Joist Manuf. Model are as designed, due to shop substitutions and manufacturing tolerances web and chord members may vary. Joist layout and metal deck fasteners would be coordinated via the Joist and Deck Erection Dwgs.
400	<p>Element modeling to include:</p> <ul style="list-style-type: none"> Welds Connection plates Member fabrication part number Quantity Spacing Anchorage Material required for proper installation Mark identification that correlates with bill of material Type of shop paint if required 	<p>Joist Manufacturer specified info comments:</p> <ul style="list-style-type: none"> Joist Mark number as well as quantity and spacing information will be provided in LOD 350. Misc. Steel and connection of Joists to support with material not provided by Joist Manuf. Should be provided via a separate model By Others (not Joist manufacturer). Shop Paint may not be modeled.



SJI BIM Guidance has also formulated a list of items and conditions based on current practices that should provide additional information to consider when formulating a BIM Execution Plan (BIMXP) for the job or when working with an SJI member company on a BIM job.

- The SJI member companies currently require Contract Documents for official project documentation.
- Structural steel models from the steel detailer or steel fabricator may be utilized by the SJI Member Company in conjunction with the Contract Documents to begin the joist detailing/design process as well as coordination checks. This may include Advanced Bill of Material (ABM) models.
- Design models provided by the AEC industry may also be used at the discretion of the SJI Member Company provided they are accurately modeled in accordance with the Contract Documents.
- In order to provide a 3-D model the SJI Member Company needs a specific amount of information from other parties typically contained in the Contract Documents due to the current limited abilities of 3-D modeling software and interoperability. If the necessary information for the 3-D model is not contained in the Contract Documents, the Purchaser remains responsible to obtain and coordinate the required information with the SJI Member Company and the other responsible parties. This information includes all additions, revisions, addendums, change orders, field conditions and modifications to the contract documents.
- All Files transmitted by the SJI Member Company are interim Files which will not contain any changes made by the SJI Member Company after the date of transmittal. Purchaser may not make any changes to the SJI Member Company 3-D models and/or 2-D drawings contained in the Files. Final 3-D models and/or 2-D drawings and information supplied by the SJI Member Company will be noted as such.
- 3-D model information provided at approval time may not precisely represent final fabricated materials due to changes which may be required as a result of missing information which will alter final SJI Member Company detailing and design.
- Final, as designed, 3-D model information will be provided once all information is known, however, actual physical dimensions and coordinates of the members may still vary slightly from the 3-D model information provided due to SJI Member Company shop fabrication tolerances, potential material inventory variances, and field installation tolerances.
- The SJI Member Company makes no guarantee that the Files are compatible with the Purchaser's software or hardware. This also applies to parties beyond the Purchaser who may utilize the SJI Member Companies 3-D model. Certain software, software settings, and hardware may cause unintended alteration of the Files or File report data.
- In the event of a conflict between the Contract Documents and the BIM Electronic Files, the Contract Documents shall control, take precedence over, and govern the BIM Electronic files. Any discovered errors or omissions in the information supplied by the SJI Member Company must be promptly reported to the SJI Member Company so that necessary corrections can be made.
- Purchaser will maintain direct control of these Files, not releasing said Files to any other party except those contracted to work on the same project, and agree to assure these Files are not used in any fashion to harm the SJI Member Company, including exposure of the Files to other SJI Member Companies. The Files may not be used on any other job or project without the written consent of the SJI Member Company for this project.

SJI manufacturers are encouraged to embrace BIM and the processes surrounding and enabling its use within the construction industry. The SJI will continue to evolve this document as the industry evolves, however, the SJI feels that providing guidance will help facilitate communication between those requesting steel joist BIM and the SJI approved steel joist manufacturer. SJI manufacturers are encouraged to embrace BIM and its process.



Reference List:

BIMForum *Level of Development Specification Version: 2013*
<http://bimforum.org/lod>