



## General Tips

- a. Provide clear dimensions from the centerlines of girders and beams to the inside face of walls. Clearly defined dimensions cut down the number of RFI's, keep the project moving, and help minimize field issues.
- b. If the project is using BIM, provide the BIM model. NMBS can extract the building layout and use the information from the BIM model to accelerate the detailing schedule. New Millennium Building Systems (NMBS) is experienced in the development of building information models for joists. NMBS has also developed an efficient process for the management of steel joist model integration into the master BIM model.
- c. Update the list of acceptable steel joists & metal decking manufacturers, to clarify: "Joists / Deck manufacturer shall be a member of SJI / SDI in good standing."

## Joist & Girder Engineering Tips

- a. Do not specify that welding needs to be per AWS D1.1 or D1.3. Steel joists are manufactured in accordance with the Steel Joist Institute welding standards. If the reference for AWS is meant for the field welding, this must be made clear on the contract documents to distinguish between joists fabrication and joists erection.
- b. Specify a finish in accordance with the Steel Joists Institute Specifications. If there are questions regarding the suitability of the joist primer, the joist manufacturer can provide primer specifications. Standard SJI Specifications require that standard shop primer conform to Steel Structures Painting Council Specification, SSPC No. 15.
- c. Clarify when additional loads (e.g. HVAC, Basketball Goals, Curtains, Piping, etc.) are already incorporated into the joist designation. In particular, it is not necessary to show loading when a KCS joists is specified, since the KCS is an envelope design.
- d. Clearly indicate whether additional loads such as mechanical loads have been included in the panel point loading indicated by the joist girder designation.
- e. When loads are not incorporated in the joist designations and they are unknown in location and/or magnitude, do not instruct the steel joists manufacturer to 'REFER TO MECHANICAL DRAWINGS'. Instead, supply a worst case load and an approximate load location on the steel joists (e.g. 10'-6" +/- 5'-0" from grid C.) The steel joists manufacturer can economically design steel joists based on this information and the design will be much more economical than a KCS steel joist selection.

## Joist & Girder Engineering Tips (continued...)

- f. On standard roof joists, do not specify live load deflection  $\leq \ell/360$  or total load deflection  $\leq \ell/240$ . Standard SJI steel joists listed in the tables are not governed by deflection limits. The uniform load in red is the load that would cause a deflection of  $\ell/360$  and is based on the rigidity of the steel joist required for strength. Furthermore, the building codes do not require this stringent of a deflection for serviceability on roofs and there are often large cost implications for meeting it. If there are other concerns regarding ponding, vibration, and deflection for curtain walls, etc., contact the nearest NMBS plant for assistance.
- g. Provide zonal uplift diagrams where applicable. Clearly specify Net Uplift, or supply the Dead Load Reduction when gross uplift values are shown.
- h. Indicate where steel joists are to receive anything other than standard SJI camber (e.g. adjacent to parallel walls, at bay length changes, etc.)
- i. Note that specifying camber different than standard SJI causes additional cost in both engineering and production. An example of this would be: “Camber joists for 5 psf Dead Load.”
- j. Note that special camber is sometimes required for constructability in areas where different lengths of steel joists are adjacent to one another. (A 100 ft. joist adjacent to a 50 ft. joist)
- k. For steel joists and girders with large axial loads (see table below), NMBS recommends using a transfer mechanism (e.g. tie plates, continuity angles, knife plates) rather than having the load transfer through the joist seat. There are limitations to the magnitude of force that can be eccentrically transferred from joist chord to joist seat anchorage. It is also important to note that a tie-plate not connected to the column will not transfer wind or seismic moment into a column. These forces must have a load path to the column as it is part of the MWFRS and the moments from these lateral loads are in opposite directions at opposing joists or girders.

<b>USE AN AXIAL LOAD TRANSFER MECHANISM (TIE PLATE, STRAP ANGLES, ETC.) WHEN AXIAL LOAD IS GREATER THAN VALUE LISTED BELOW</b>	
<b>K-SERIES</b>	<b>5 KIPS</b>
<b>LH-SERIES</b>	<b>10 KIPS</b>
<b>JOIST GIRDER</b>	<b>15 KIPS</b>

- l. When joists bear on masonry, SJI specifications require that the embed plate be located within 1/2” of the inside face of the wall. Sometimes contract drawings specify embed plates centered on the wall and unless deeper joist seats can be provided, it is impractical to locate the working point over the center of the wall. The latest SJI specification requires that the seat depth be increased when the working point is moved further away from the face-of-wall.
- m. Provide loading diagrams where ‘SP’ joists are specified.
- n. NMBS standard hole-gage on joist seats on K-Series joists is 3-1/2”. Often, 3-1/4” is shown on the contract drawings.
- o. 8K1 joists are obsolete and no longer included in the SJI tables. Specify minimum 10K1.

## Joist & Girder Engineering Tips (continued...)

- p. The SJI 10K1 tables do not show load values for joist less than 10'-0". In this case, specify a joists substitute. JS series are easier to fabricate, ship, and erect. Joists with spans less than 6'-0" absolutely must be specified as joist substitutes.
- q. Clearly indicate skewed bearing conditions. For example, note any special bearing plates provided at skewed edge of beam flanges. Note that joist bearing on skewed support may require deeper bearing seats.
- r. When the project has working points in a skewed layout, make sure that all necessary dimensions and working points are provided. Provide angular dimensions to as many significant digits as possible to prevent guessing; such as whether 73° means 73.000° or 72.687°. The distinction can make a significant difference in the layout of the framing plan.
- s. Do not dimension bridging rows on roof framing plan unless there are additional considerations. In such cases, clearly call out the additional requirements. Simply showing the number or rows of bridging allows for coordination between trades (e.g. ESFR sprinkler vendor, etc.) to avoid interference issues. Having the ESFR sprinkler locations shown on the contract drawings will allow for economical joists design and efficient work flow between trades.
- t. Show the edge of cap plate dimension at column details on structural drawings to ensure that joist have adequate clear bearing at seat.
- u. Show the beginning, intermediate, and ending joists spacing on the framing plan. This will allow for coordination between all trades. Try to locate joists at column lines to minimize the number of OSHA column joists.
- v. Where expansion joints are necessary, indicate the increased length of slots in bearing seats. Additional clear bearing will be required, so the joist end webs do not interfere with the support.
- w. Do not preclude the use of cold-formed material on steel joists. Instead, specify that the joists are to be designed in accordance to SJI specifications. NMBS uses cold form steel angles and channels that are allowed by the SJI specifications.
- x. When joists bear on girders at column centerlines, and the joists are less than 12" deep, standard joist bottom chord extensions to stabilizer plates cannot be used. For these cases, use deeper joists, specify loose (field installed) bottom chord extensions, or use a detail similar to the one shown in figure 1.

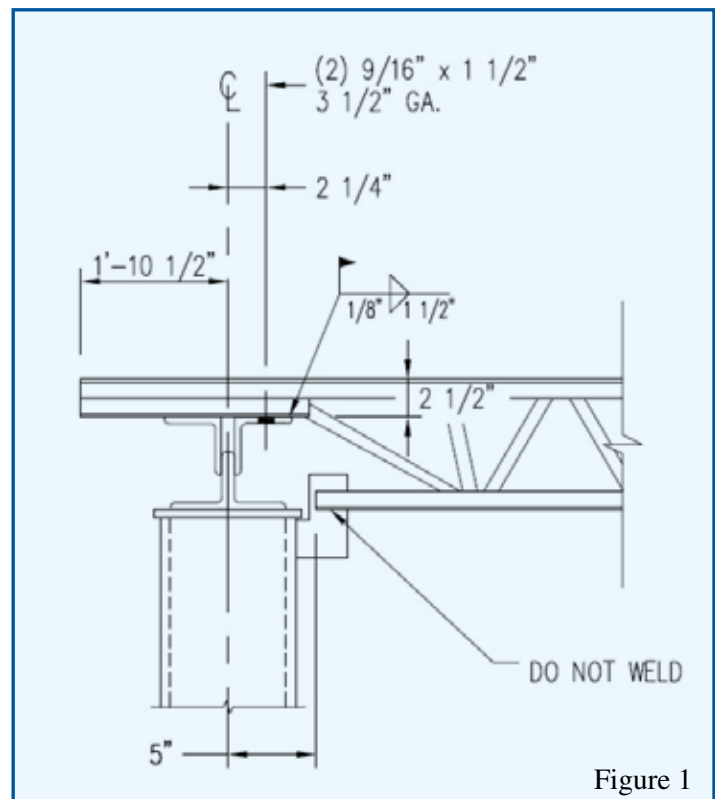


Figure 1

## Joist & Girder Engineering Tips (continued...)

- y. Where beams frame into joist girder interior panels (not at column center-lines), specify only the number of bolts (A325 ¾") and locations required. See figure 2. NMBS will design the joist or girder to receive and support the connecting material and load transfer. Also, specify any additional loads required from beam to girder connections.

## Deck Engineering Tips

- a. It is not necessary to specify the section properties from the deck manufacturer tables selected from the deck catalog.
- b. Web crippling must be checked when 3" composite deck is bearing on supports less than 5" wide. At ends of 3" composite deck sheets, web crippling may occur if 2-1/2" minimum bearing is not provided.
- c. Do not show composite deck bearing on top of bent plate when studs are to be installed on beams. Deck is usually held back to eliminate a gap or deflection.
- d. Show specific deck type, gage, finish, and attachment on contract documents in lieu of making reference to specifications. Specs often indicate generalities.
- e. SDI does not recommend the use of weld washers on deck 22 gage and thicker.
- f. Keep in mind that nestable or interlocking side laps may not be required. Allow alternates to be used.
- g. Deck attachment patterns are not specified by the deck manufacturer. These should be clearly shown on the contract documents.
- h. Venting is not recommended for structural slabs. When vented deck is specified, indicate if standard 0.5% venting is acceptable. For more information, download the Steel Deck Institute publication Venting of Composite Floor Deck located at: <http://www.sdi.org/states.htm> Note that this is applicable to Lightweight Insulating Concrete fill (LWIC) and does not apply to normal-weight or light-weight concrete which are structural components in a floor system.
- i. Where deck changes direction, provide detail for deck support (e.g. tube steel or other) to be field installed between steel joists.
- j. Contract documents need to clearly designate roof or floor openings that are to be decked over in accordance to OSHA Regulation 29 CFR Section 1926.754 (e)(2).

