

Fig. 4.2.7 Deck Support Angle

The continuous angle shown can be designed as the diaphragm chord, or the diaphragm horizontal shear forces can be transferred down to the top chord of the girder, whereby the girder top chord can furnish the required chord strength. The need for the angle as a deck support member should be determined first. In many buildings the angle is provided to support the deck and attached roofing materials from tearing due to construction and foot traffic on the roof. If the angle is to be provided for this purpose it can then also be sized for the diaphragm chord requirements. A word of caution is appropriate here. If the edge angle is to be continuous as shown then an additional detail illustrating how the angle pieces are to be joined should be provided. If this detail is not shown it is likely the angles will simply be butted together and not connected.

The angle may also be required because of the diaphragm shear requirements for loads in the perpendicular direction, i.e. if the shear forces are such that sidelap connectors are required between the deck sheets, then sidelap connectors are also required at the edge of the diaphragm. The need for sidelap fasteners does not stop at the diaphragm edge. If the edge connectors are omitted then the fasteners connecting the deck to the joist will be overstressed. The joist seat shown in Fig. 4.2.7 can be used as a shear collector, i.e. a shear transfer device. The rollover capacity of typical joist seats is about 1920 pounds. This capacity is discussed in Chapter 7. If additional capacity is required then some other kind of shear transfer device must be used. Once the load is in the joist girder top chord a proper force path to connect girder to girder must be provided. A detail similar to that shown in Fig. 4.2.5 can be used if required.

Shear Collectors

Details must be provided to transfer the diaphragm shears into the vertical bracing system. A variety of details have been used. In the preceding paragraphs the transfer of

deck shears to joist girder top chords was briefly discussed. For relatively small shears it was pointed out that the joist seat could be used for this transfer. If sidelap fasteners are required then a “drag strut” or shear transfer device would likely be required between the diaphragm deck and the joist girder top chord or edge beam. The details shown in Figs. 4.2.8 and 4.2.9 have been used successfully. A joist substitute (VS joist) can be used in lieu of the 2-1/2 inch square tube shown in Figure 4.2.8. Care must be taken to position the 2-1/2 inch square tube or the channel so that the deck flat rests against the top flange of these members. This is necessary to provide for the arc spot welds or other fasteners to the shear collector. Fastening can be clustered at selected shear collectors but care must be taken not to overstress the diaphragm by funneling all of the horizontal shear into or out of the system at one location. The AISI specification provides the designer with equations for calculating allowable arc spot weld stresses for shear.

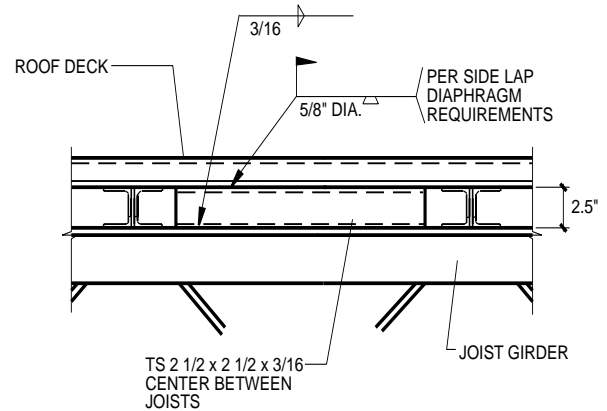


Fig. 4.2.8 Shear Collector with K Joist

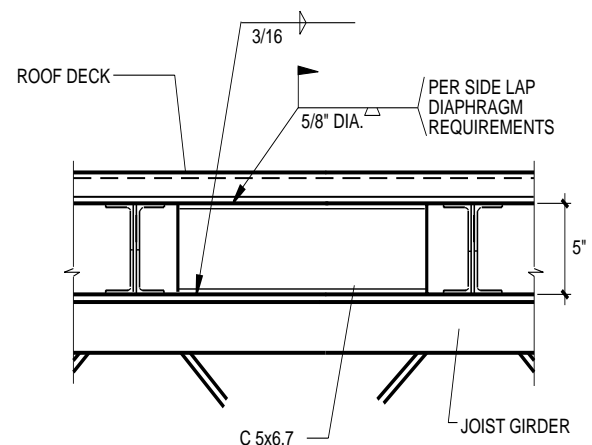


Fig. 4.2.9 Shear Collector with LH Joist