COMMERCIAL & RESIDENTIAL GARAGE DOOR DIVISION
DASMA TECHNICAL DATA SHEET
#199

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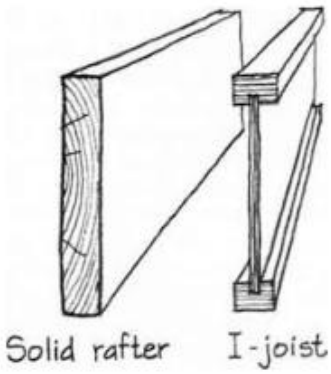
Residential Garage Door Installation Details With Prefabricated Wood I-Joists

Wood I-joists are composite structural members formed from a variety of wood products and shaped like a steel I-beam, with a web capped by flanges on top and bottom. Raw materials include laminated veneer lumber (LVL), plywood, OSB and more. These joists meet rigorous load rating and performance standards, and have become popular in residential construction, including in garage ceilings, in place of solid rafters.



Garage door dealers have questioned how to mount back-hangs to ceiling I-joists. DASMA and APA – *The Engineered Wood Association* collaborated to create a document to address that issue. That document, designated TT-130 and titled *Residential Garage Door Installation Details with Prefabricated Wood I-joists*, was published by APA and is available for free download from the APA Resource Library: https://www.apawood.org/resource-library

A copy of the document is also reproduced below, with permission of APA – *The Engineered Wood Association*. All recommendations concerning installation details, including fastener sizes, spacing, and back-hang gauge, are subject to the garage door manufacturer's approval and written instructions.

APA Technical Topics
TT-130 MARCH 2021

Residential Garage Door Installation Details with Prefabricated Wood I-Joists

Prefabricated wood I-joists are frequently used in residential construction, including the floor framing in the second story above the garage. This document provides a method for garage door installation with back-hangs that are attached to the bottom flange of residential I-joists with lag screws. Other methods can be used if approved. These details may not be appropriate for fire sprinkler installation, which must comply with NFPA 13 and is covered in the *APA Technical Note for Sprinkler Pipe Installation for APA Performance Rated I-Joists*, Form J745.

It is important to note that the loads applied and attached to the bottom flange must be accounted for in the I-joist design before the garage door installation.

A) Garage Door Track Parallel to I-Joists

Table 1 provides a recommendation for garage door installation to the bottom flange of residential I-joists through back-hangs using lag screws when the garage door track is parallel to I-joists. Figure 1 shows the details with or without a direct-attached gypsum ceiling between the perforated steel angle and the bottom flange when the garage door track is parallel to I-joists. The direct-attached ceiling is assumed to be single-layer gypsum of 1/2 or 5/8 inch in thickness without resilient or hat channels.

TABLE 1

RECOMMENDATIONS FOR GARAGE DOOR INSTALLATION WITH BACK-HANGS (GARAGE DOOR TRACK PARALLEL TO I-JOISTS[a])

Garage Door Total Weight (lbf)	Load at Each Back-Hang (lbf)	Lead Hole Diameter (in.)	Fasteners to Attach Steel Angle[b] to Bottom Flange	
			Without Gypsum Ceiling (Figure 1a)	With 1/2 in. or 5/8 in. Direct-Attached Gypsum Ceiling (Figure 1b)
≤ 600[c]	≤ 150	1/8	1/4 in. or 5/16 in. dia. x 2 in. long[d] lag screw	1/4 in. or 5/16 in. dia. x 2-1/2 in. long[d] lag screw

a. The I-joist flange shall be at least 1-3/4 inches in width and 1-1/8 inches in thickness.

b. Use 14 gauge perforated (slotted) steel angles of sufficient capacity to carry a concentrated load of at least 150 lbf at a 24-inch span.

c. An engineering design is required if the total garage door weight exceeds 600 lbf.

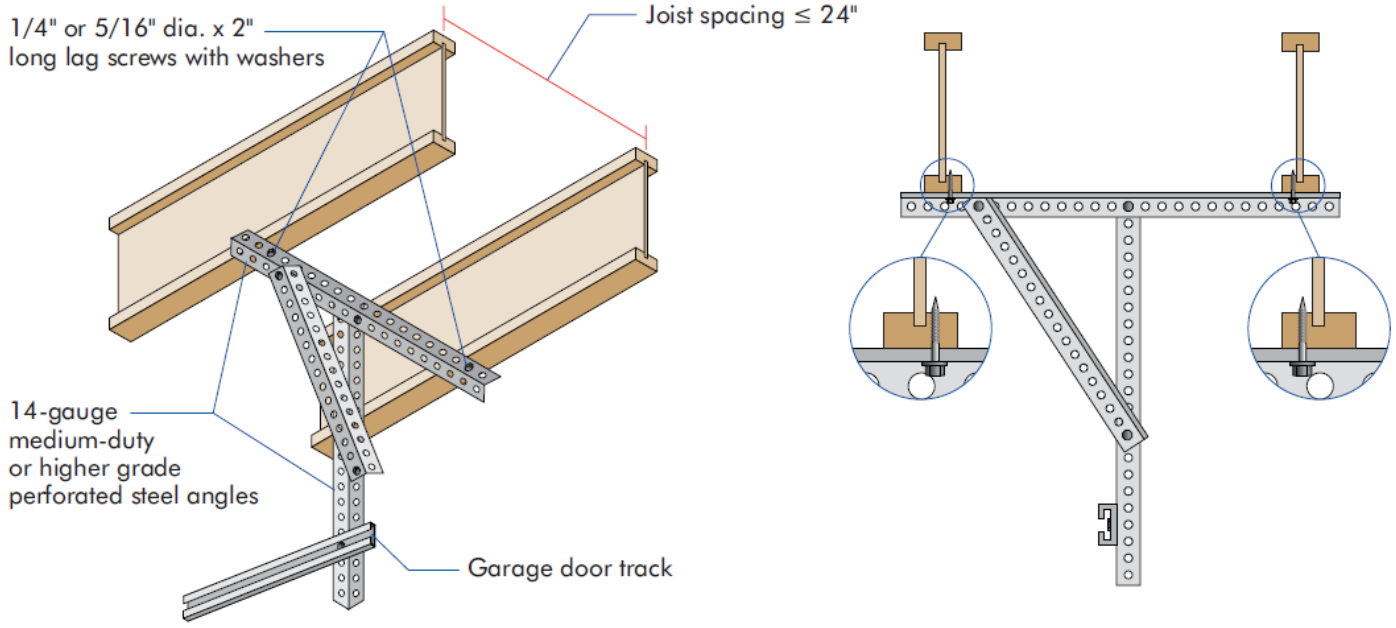
d. Use only lag screws as specified.

A lead hole, as specified in Table 1, offset approximately 1/2 inch from the centerline of the flange shall be predrilled to avoid splitting the I-joist bottom flange before the installation of the lag screw. The lag screw shall be installed by turning with a wrench, but not driving with a hammer. The vertical steel angle and the diagonal brace, as shown in Figure 1, may be installed at any location along the length of the horizontal steel angle.

Residential Garage Door Installation Details with Prefabricated Wood I-Joists

FIGURE 1A

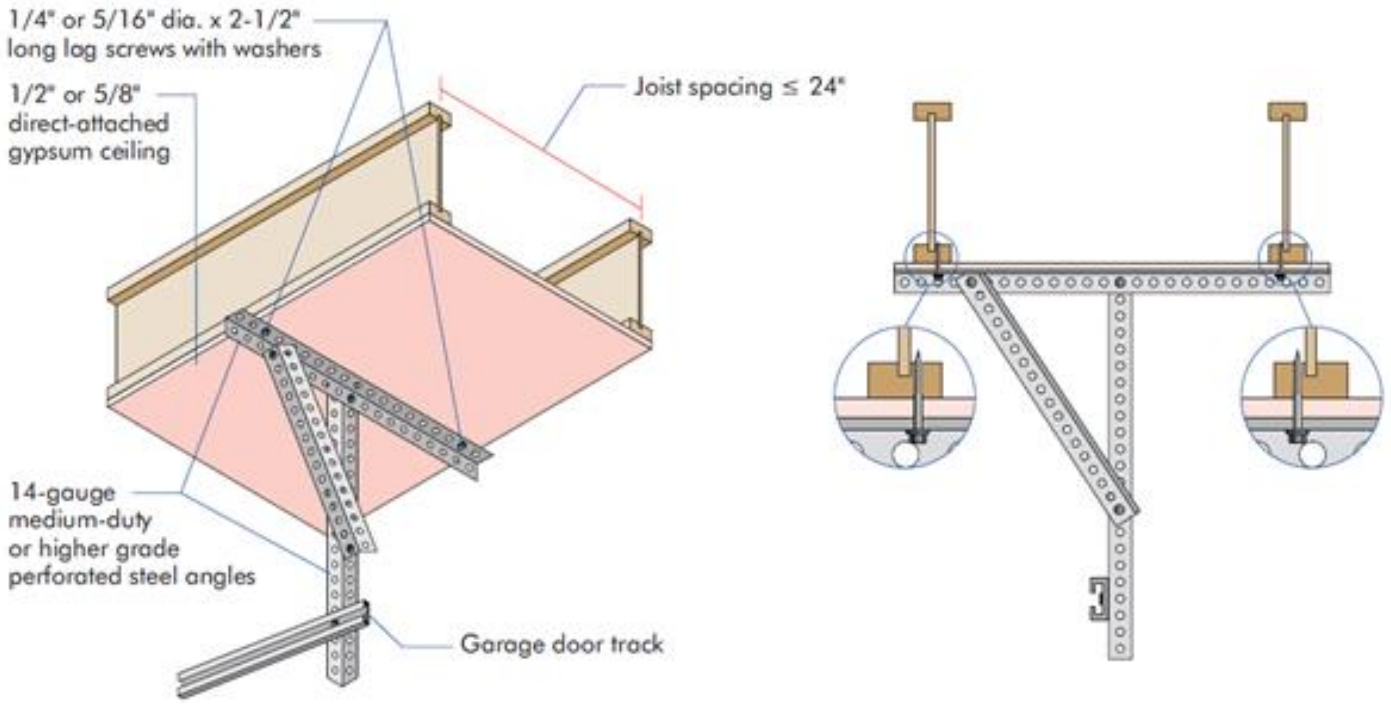
BACK-HANG INSTALLATION DETAILS WITHOUT DIRECT-ATTACHED GYPSUM CEILING WHEN THE GARAGE DOOR TRACK IS PARALLEL TO I-JOISTS



The vertical steel angle and the diagonal brace may be installed at any location along the length of the horizontal steel angle between lag screws.

FIGURE 1B

BACK-HANG INSTALLATION DETAILS WITH DIRECT-ATTACHED GYPSUM CEILING WHEN THE GARAGE DOOR TRACK IS PARALLEL TO I-JOISTS



The vertical steel angle and the diagonal brace may be installed at any location along the length of the horizontal steel angle between lag screws.

B) Garage Door Track Perpendicular to I-Joists

Table 2 provides a recommendation for garage door installation when the garage door track is perpendicular to I-joists. Figure 2 shows the details with or without a direct-attached gypsum ceiling between the perforated steel angle and the bottom flange when the garage door track is perpendicular to I-joists. The direct-attached ceiling is assumed to be single-layer gypsum of 1/2 or 5/8 inch in thickness without resilient or hat channels.

TABLE 2

RECOMMENDATIONS FOR GARAGE DOOR INSTALLATION WITH BACK-HANGS (GARAGE DOOR TRACK PERPENDICULAR TO I-JOISTS[a])

Garage Door Total Weight (lbf)	Load at Each Back-Hang (lbf)	Lead Hole Diameter (in.)	Fasteners to Attach 2x4 Block to Bottom Flange		Fasteners to Attach Steel Angle[b] to 2x4 Block	
			Without Gypsum Ceiling (Figure 2a)	With 1/2 in. or 5/8 in. Direct-Attached Gypsum Ceiling (Figure 2b)	Without Gypsum Ceiling (Figure 2a)	With 1/2 in. or 5/8 in. Direct-Attached Gypsum Ceiling (Figure 2b)
≤ 600[c]	≤ 150	1/8	1/4 in. or 5/16 in. dia. x 3 in. long[d] lag screw	1/4 in. or 5/16 in. dia. x 4 in. long[d] lag screw	1/4 in. or 5/16 in. dia. x 1-1/2 in. long[d] lag screw	

a. The I-joist flange shall be at least 1-3/4 inches in width and 1-1/8 inches in thickness.

b. Use 14 gauge perforated (slotted) steel angles of sufficient capacity to carry a concentrated load of at least 150 lbf at a 24-inch span.

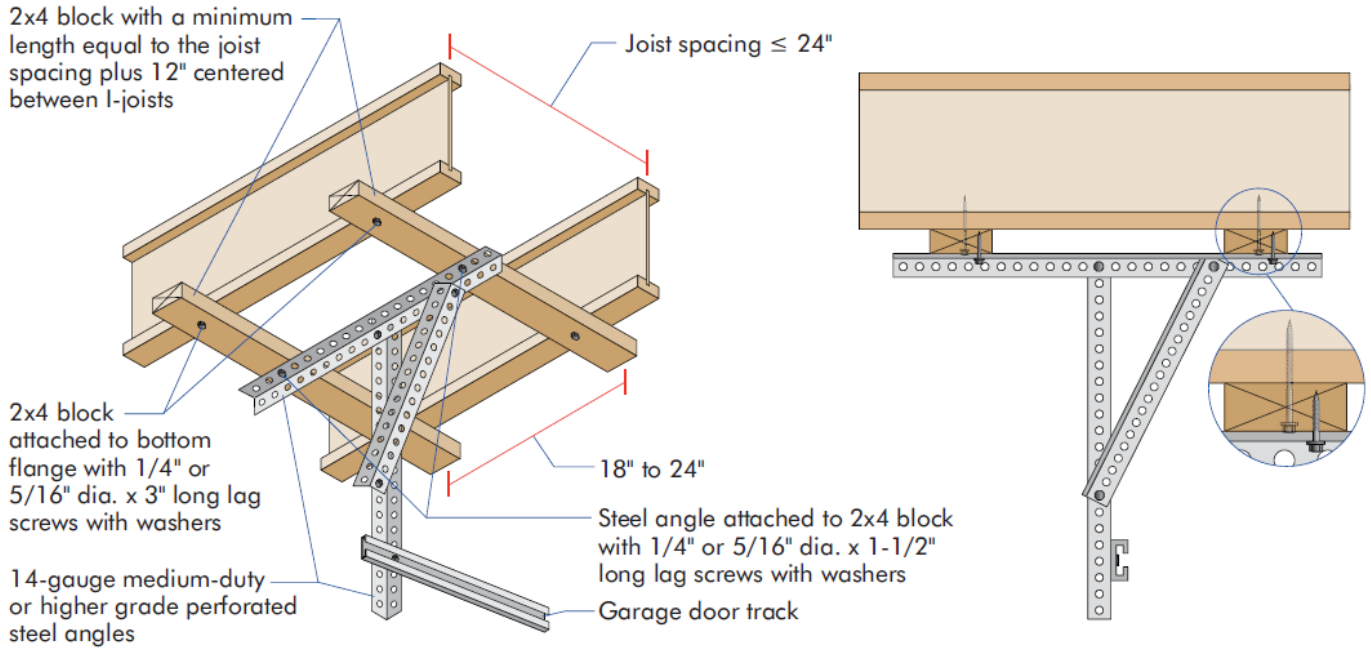
c. An engineering design is required if the total garage door weight exceeds 600 lbf.

d. Use only lag screws as specified.

A lead hole, as specified in Table 2, offset approximately 1/2 inch from the centerline of the flange shall be predrilled for the lag screw used to attach the 2x4 block to the bottom flange to avoid splitting the I-joist bottom flange before the installation of the lag screw. The lag screw shall be installed by turning with a wrench, but not driving with a hammer.

FIGURE 2A

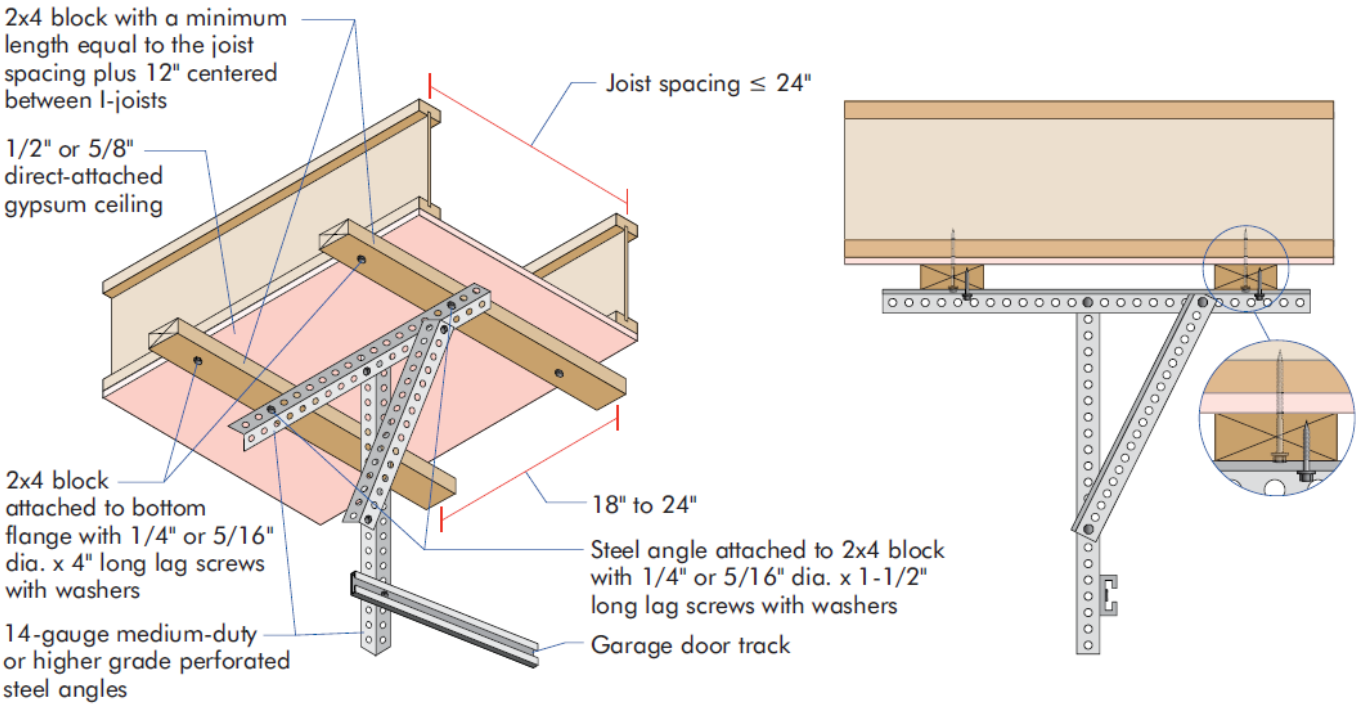
INSTALLATION DETAILS WITHOUT DIRECT-ATTACHED GYPSUM CEILING WHEN I-JOISTS ARE PARALLEL TO THE GARAGE DOOR



The horizontal steel angle shall be centered between the 2x4 blocks, but may be installed at any location along the length of the 2x4 blocks between I-joists. The vertical steel angle and the diagonal brace may be installed at any location along the length of the horizontal steel angle between lag screws.

FIGURE 2B

INSTALLATION DETAILS WITH DIRECT-ATTACHED GYPSUM CEILING WHEN I-JOISTS ARE PARALLEL TO THE GARAGE DOOR



The horizontal steel angle shall be centered between the 2x4 blocks, but may be installed at any location along the length of the 2x4 blocks between I-joists. The vertical steel angle and the diagonal brace may be installed at any location along the length of the horizontal steel angle between lag screws.

The 2x4 block shall be cut from No. 2 or better grade lumber (any species that has a published specific gravity of 0.42 or higher in accordance with the *National Design Specification for Wood Construction*) and shall be chosen to avoid knots that are more than 1/2 inch in diameter at any cross-section. It shall have a minimum length equal to the I-joist spacing plus 12 inches and shall be centered between adjacent I-joists when installed with the lag screws to provide an end distance of approximately 6 inches to avoid end split.

The horizontal steel angle, as shown in Figure 2, shall be centered between the 2x4 blocks, but may be installed at any location along the length of the 2x4 blocks between I-joists provided that the lag screw attaching the 2x4 block to the I-joist bottom flange and the lag screw attaching the horizontal steel angle to the 2x4 block are staggered at least 1-1/2 inches (this applies when the horizontal steel angle has to be installed in the vicinity underneath and parallel to one of the I-joists). The vertical steel angle and the diagonal brace may be installed at any location along the length of the horizontal steel angle between lag screws.