

JJI-JOIST TECHNICAL BULLETIN

SUBJECT: JJI-Joist Framing around Stair Openings Bulletin Number: Date Issued:

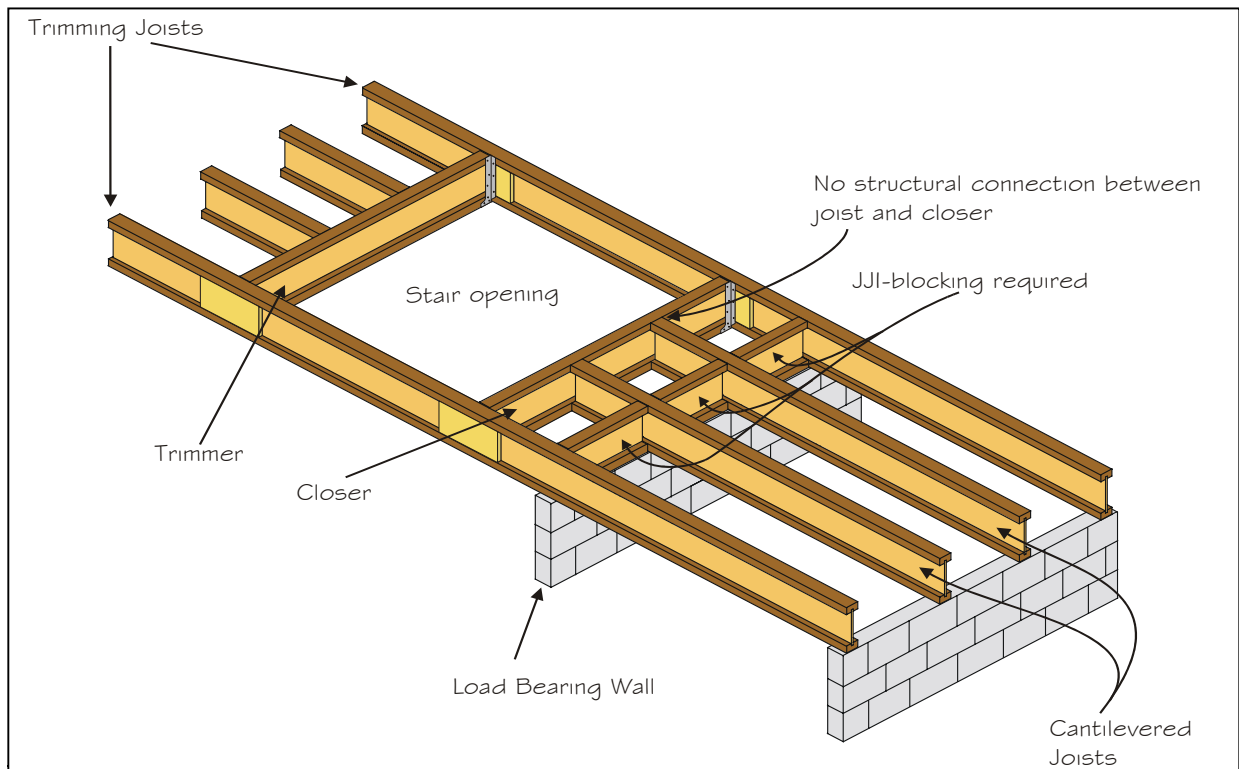
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Introduction

Other I-Joist floor systems allow designers to take advantage of conveniently located load-bearing walls to design some joists as cantilevers around stair openings as shown in Figure 1. The traditional approach, and the approach adopted by James Jones until now, would be to design the joist as a two span member.



This technical bulletin gives James Jones recommendations for framing cantilever joists around stair openings and describes changes introduced in FloorMaster version 2.01.72 that can automatically design cantilever joists at stairwells where appropriate.

Full scale laboratory tests carried out as part of a DETR sponsored research project on floors framed as indicated in Figure 1 showed such arrangements to perform satisfactorily within the limits described in this document. The research project did highlight the importance of good site practice, particularly with regard to the fixing of the floor deck, which acts as a structural diaphragm. James Jones strongly recommends gluing the floor deck to the joists.

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Cantilever Joist Framing

Based on the aforementioned laboratory tests, framing arrangements and design recommendations have been developed for situations where the ratio of backspan to cantilever span is in the range 3:1 to 5:1. Table 1 below shows the range of ratios allowed and refers to the applicable construction details 1 and 2 shown on sheet 4.

BACKSPAN TO CANTILEVER RATIO	CANTILEVER ALLOWED	CONSTRUCTION DETAIL
Up to 3:1	NO	Detail 2. Joists designed as a two span member supported at one end by the closer. The closer acts as the trimmer
From 3:1 to 5:1	YES	Detail 1. Joists cantilevered and no structural connection between joist and stair closure
Over 5:1	NO	Detail 2. Joists designed as a two span member and supported by the closer which acts as a trimmer. Refer to sheet 5 for further construction and design options available to the designer when the span ratio is greater than 5:1

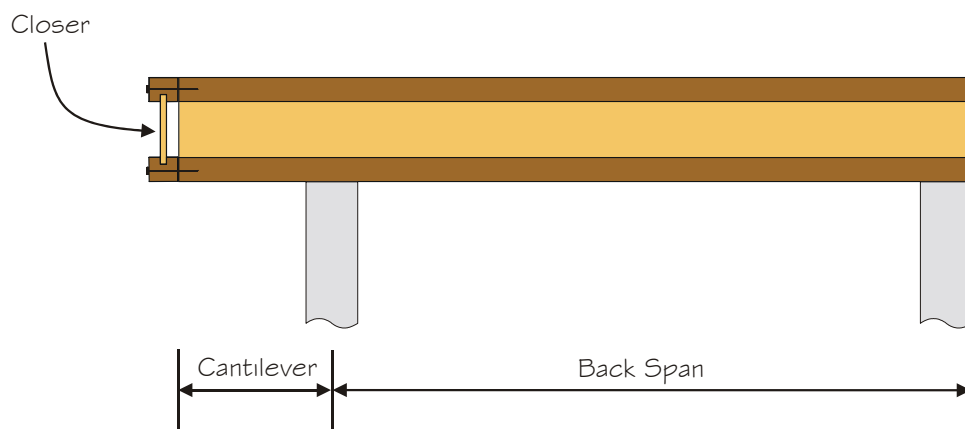


Table 1. Span Ratios for Cantilever Joists at Stairwells

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Based on the span ratios given, the following Table 2 shows the broad range of cantilever spans and back spans over which the details 1 and 2 are applicable. Note that the maximum cantilever span allowed in this situation is 1200mm.

DETAIL REFERENCE TABLE

Cantilever Distance (mm)	Back Span (mm)								
	2000	2500	3000	3500	4000	4500	5000	5500	6000
400	1	2	2	2	2	2	2	2	2
500	1	1	2	2	2	2	2	2	2
600	1	1	1	2	2	2	2	2	2
700	2	1	1	1	2	2	2	2	2
800	2	1	1	1	1	2	2	2	2
900	2	2	1	1	1	1	2	2	2
1000	2	2	1	1	1	1	1	2	2
1100	2	2	2	1	1	1	1	1	2
1200	2	2	2	2	1	1	1	1	1
1300	2	2	2	2	2	2	2	2	2

Table 2. Range of Cantilever Spans and Detail References

The details and cantilever span ratios given in this document are applicable to domestic floors and flats with not more than four units per storey. For all other applications consult JJ & Sons Ltd TSD Engineering Department.

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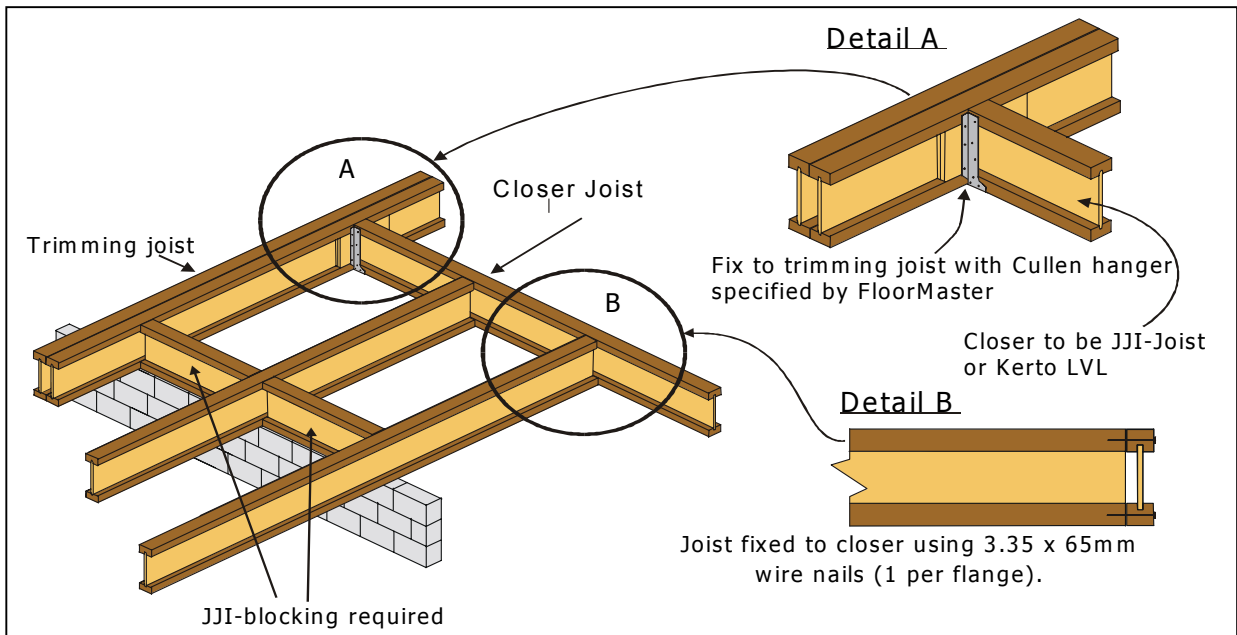
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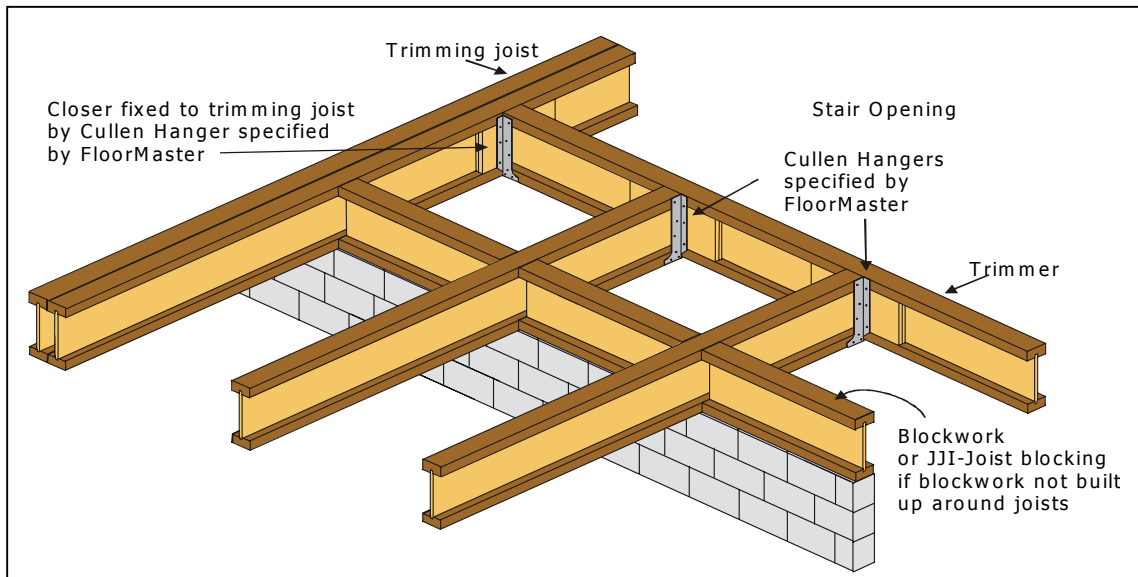
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Detail 1. Cantilever Joist Framing around Stair Opening



Detail 2. Non-cantilever Joist Framing around Stair Opening



Detail 2 is adopted when the span ratio is either less than 3:1 or greater than 5:1. For guidance on further design and construction details available to the designer when the span ratio is greater than 5:1 refer to sheet 5.

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Cantilever Joist Framing in FloorMaster

Version 2.01.72 of FloorMaster incorporates enhancements that can automatically design cantilever joists at stairwells where appropriate. The program will lay out joists around the stairwell in the usual manner. When the *Design Floor* button is pressed the program determines whether a load-bearing wall is present as shown in Figure 1 and checks the span ratios. Where the span ratio is in the range 3:1 to 5:1 the joists are designed as cantilevers and the hangers are specified as shown in Detail 1. Alternatively, where the span ratio is less than 3:1 or more than 5:1 the joists are designed as two span members. Reactions from the ends of the joists are applied to the trimmers and hangers are specified as shown in detail 2. Note that the program automatically removes the standard load from the trimmer as described in Technical Bulletin No. 6, except if the trimmer has been converted to a beam by the user, when the standard load should be removed manually by the user.

Where the span ratio is greater than 5:1 and FloorMaster has automatically designed the joist as a 2 – span member, the user has a few options available.

1. If the joist sizes and metalwork given by FloorMaster are acceptable then leave the arrangement unaltered.
2. If the joist size is not acceptable or the metalwork is given as “undefined “ (no suitable hanger available) consider two courses of action
 - a) convert the joists to beams and split on the load bearing wall to produce two single span joists. Re-design.
 - b) consult JJ & Sons Ltd TSD Engineering Department for case specific advice on whether it is allowable to manually alter the joists to design as cantilevers.

Note that option 2b) should only be used after consultation with JJ & Sons Ltd TSD Engineering Department.

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