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## *chapter 10.* DECKS, STAIRS, AND OTHER EXPOSED WOOD ASSEMBLIES

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### 10.1 GENERAL

This section addresses light-frame construction (generally 2 inch to 4 inch thick members) exposed to the exterior elements. General principles for decay-resistant design are illustrated only because variables in specific cases are so great. Appropriate detailing depends on exposure conditions, types of wood used, actual dimensions of members, and many other factors that influence the risk of decay occurrence. Careful detailing is required even for the average exposure condition. It is the authors' opinion that all exposed lumber should be wood that is highly decay resistant or, better yet, properly pressure treated.

### 10.2 EXPOSED END GRAIN

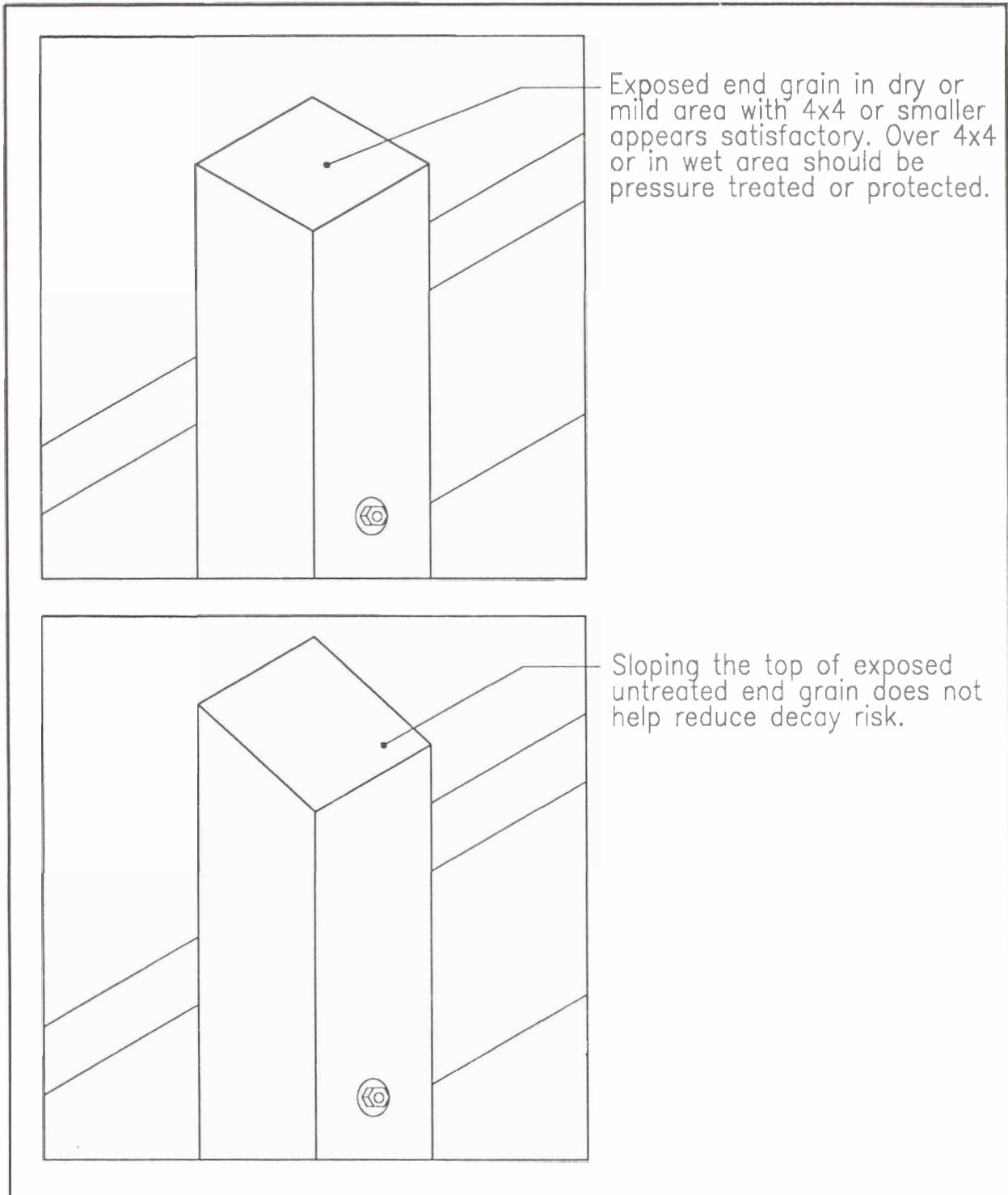
If not protected from water, horizontal end-grain surfaces, such as the top of an exposed column, will absorb water rapidly into the cut ends of the wood cells. If the member is large, this absorption will result in increasing moisture content inside the member, because drying time is approximately proportional to the square of the thickness. Generally, members with a minimum dimension of 4" nominal or larger should be either protected from water exposure or treated with preservatives. If treated wood is to be cut on site, dip treatment is an appropriate, helpful technique that marginally protects the cut surface. End grain at joints is particularly

vulnerable and should be protected even in smaller members. Periodic application of a water repellent has substantial protective value in exposed end joints.

For years recommendations to slope the tops of posts and columns were followed. Unfortunately, this technique does not reduce water absorption. Regardless of the top slope, water will be absorbed through the exposed open cell ends and through the inevitable end checks. It can be argued that top sloping increases absorption by creating a larger end grain surface area (see **Figure 10-1**).

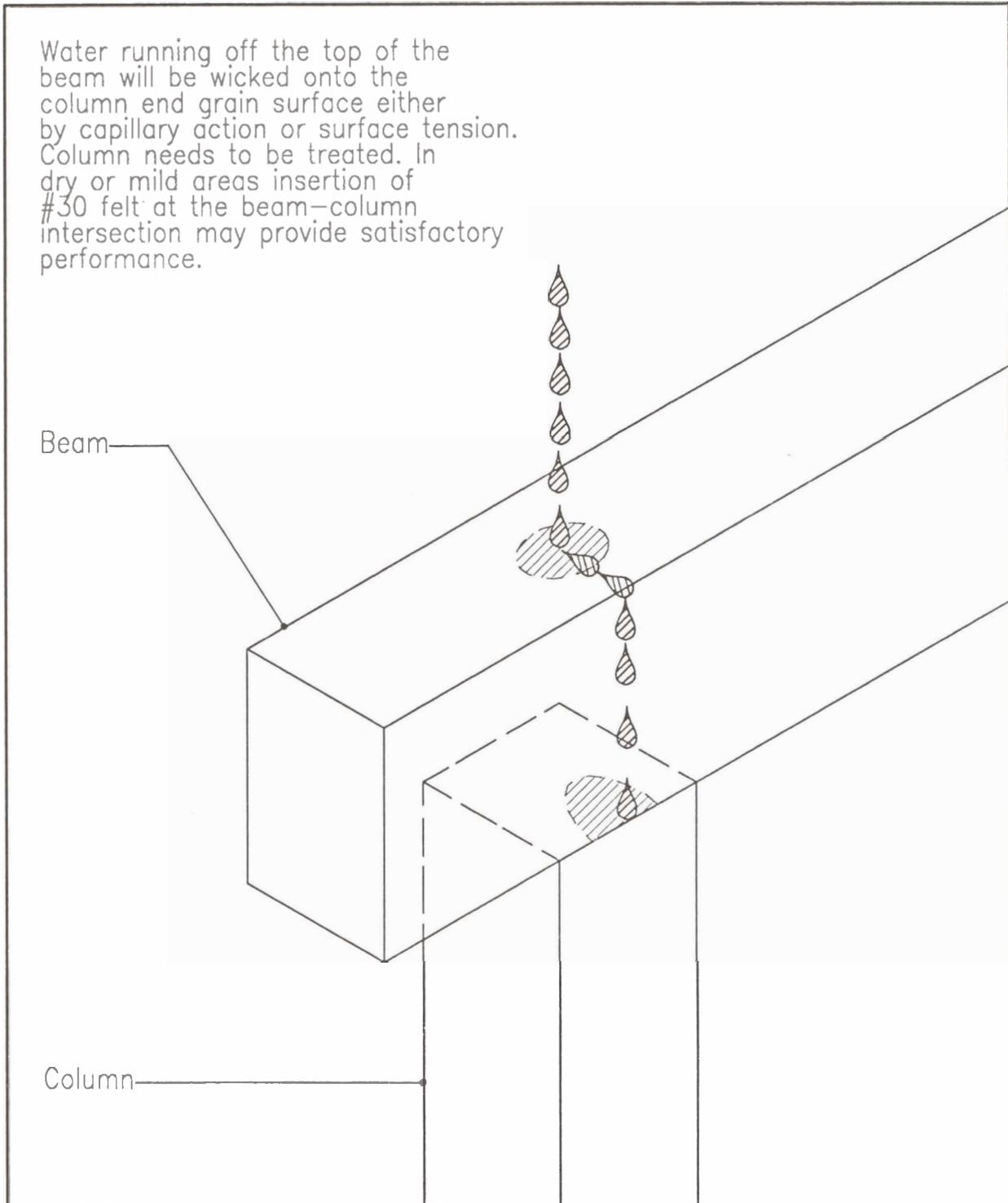
End grain surfaces only get wet not only via rain or irrigation water from above, but also by capillary absorption from the side and below. The end grain surface of a column base can absorb water from the ground or from the metal column base. The end grain should always be separated from horizontal concrete or metal surfaces that can hold water for absorption and retard drying of the member. The member should also be pressure treated.

Wetting also occurs when an exposed beam sits on top of a column (see **Figure 10-2**), where water can run down the side of the beam and be absorbed by capillary action into the joint and then into the column end grain surface. The preservative treatment of this area is essential.



## EXPOSED END GRAIN COLUMN TOP DETAIL

Figure 10-1



## EXPOSED CONNECTION BEAM COLUMN JOINT

Figure 10-2

### 10.3 DECK CONTACT AREAS

The contact surfaces between pieces of wood are particularly vulnerable to decay. These areas hold water by capillary action and do not dry quickly. The smaller the minimum dimension of the contact surface, generally the faster the joint area will dry.

Several locations in a typical deck should be carefully designed to avoid this problem:

#### 10.3.1 Deck Boards (Figure 10-3)

Deck boards should be spaced at least 1/4 inch apart. Because debris can be caught in this space and retain moisture, details should prevent the collection of debris as much as possible. A good detail is to use nominal 2 inch lumber ripped longitudinally at an angle. When deck boards are laid with the wide surface up, debris will fall on through the tapered opening instead of being caught. The additional coverage (8% for 2x8) with this improvement will help pay for the cost of ripping.

#### 10.3.2 Deck Board on Joist

Decking resting on joists creates many small horizontal contact surfaces where water collects and decay can occur. The only appropriate solution is to use properly preservative-treated joists and deck boards. Other solutions, such as felt or metal flashing, are marginal at best. Further, the increased labor costs of such a system may be more than the cost of preservative treatment.

#### 10.3.4 Decking Butt Joint (Figure 10-4)

Spaced double joints will allow deck board end joints without the wood-to-wood

contact vesting on a watertable inherent in a single joist system. If the ends are underbeveled (Figure 10-4), debris will fall clear and allow rapid drying, essential if joists and/or deck boards are untreated.

### 10.4 BOLTED CONNECTIONS

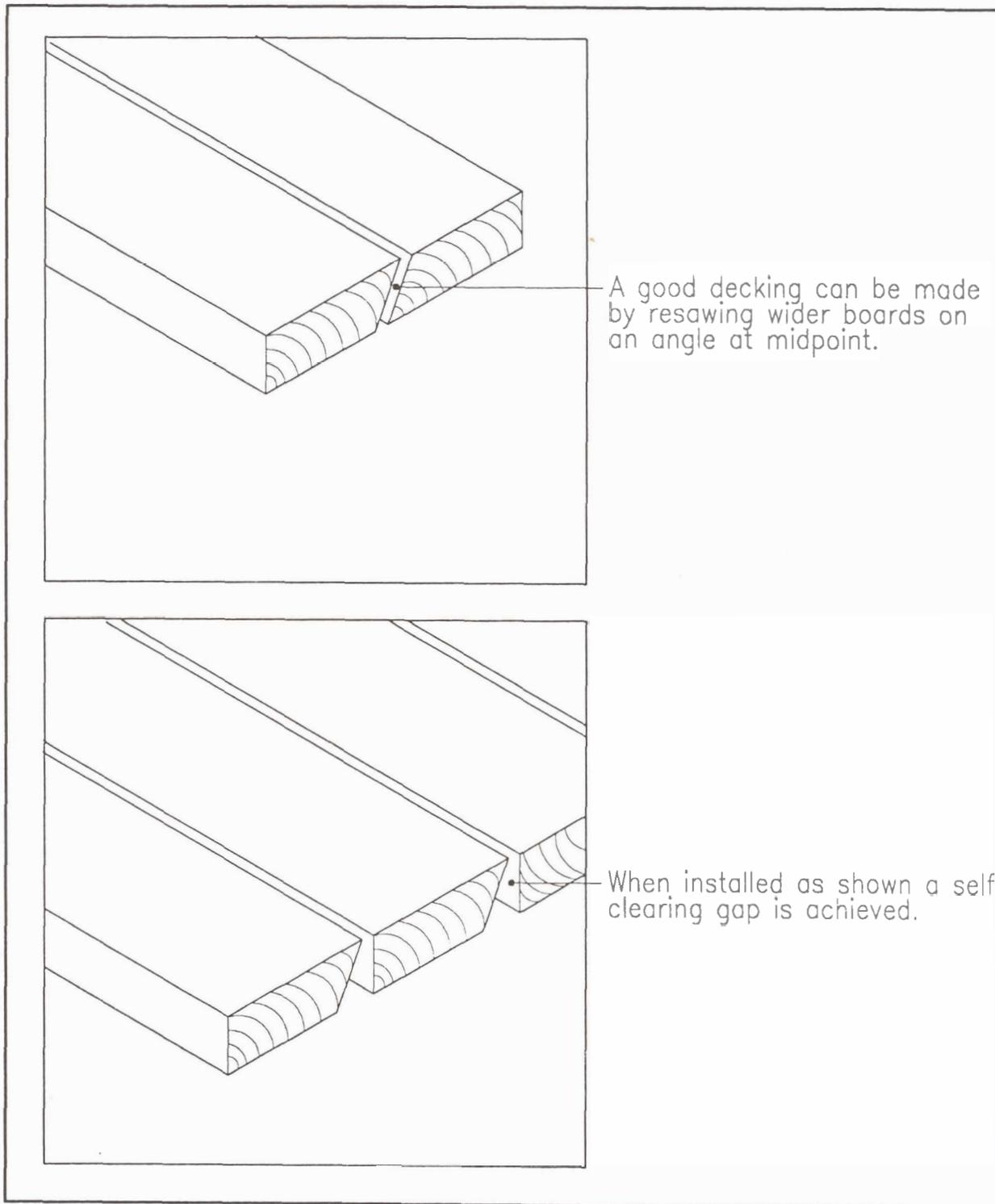
When wood members are bolted together side by side, unless the contact surface is small, a space should be provided at these vertical contact surfaces to keep water from collecting. The space needed to break capillary action may be as small as 1/16 inch if debris cannot collect. Galvanized metal washers or treated plywood spacers can be used for this purpose (see Figure 10-5).

### 10.5 STAIRS

The stair stringer that has been cut to accept treads, leaving end grain surfaces exposed, is particularly vulnerable. Where possible, exterior stair stringers should not be cut or notched (Figure 10-6).

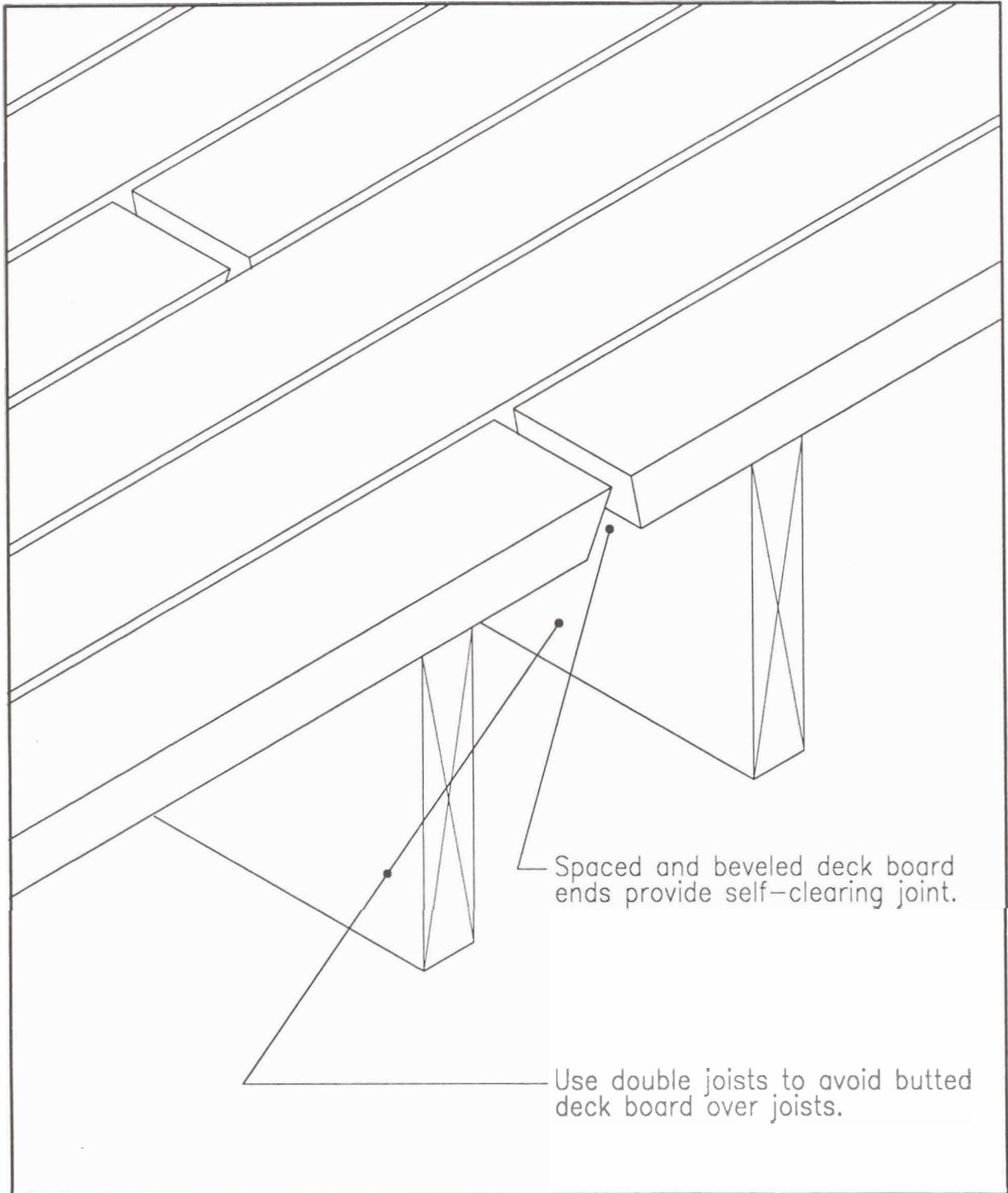
### 10.6 MULTISTORY COLUMNS

Decks and balconies supported by platform construction on one side and multistory columns on the other require the designer to consider the crossgrain shrinkage of plates and joists in relationship to the limited shrinkages of the columns (see Table 4-1). A simple solution is to construct the column side to a lower elevation.



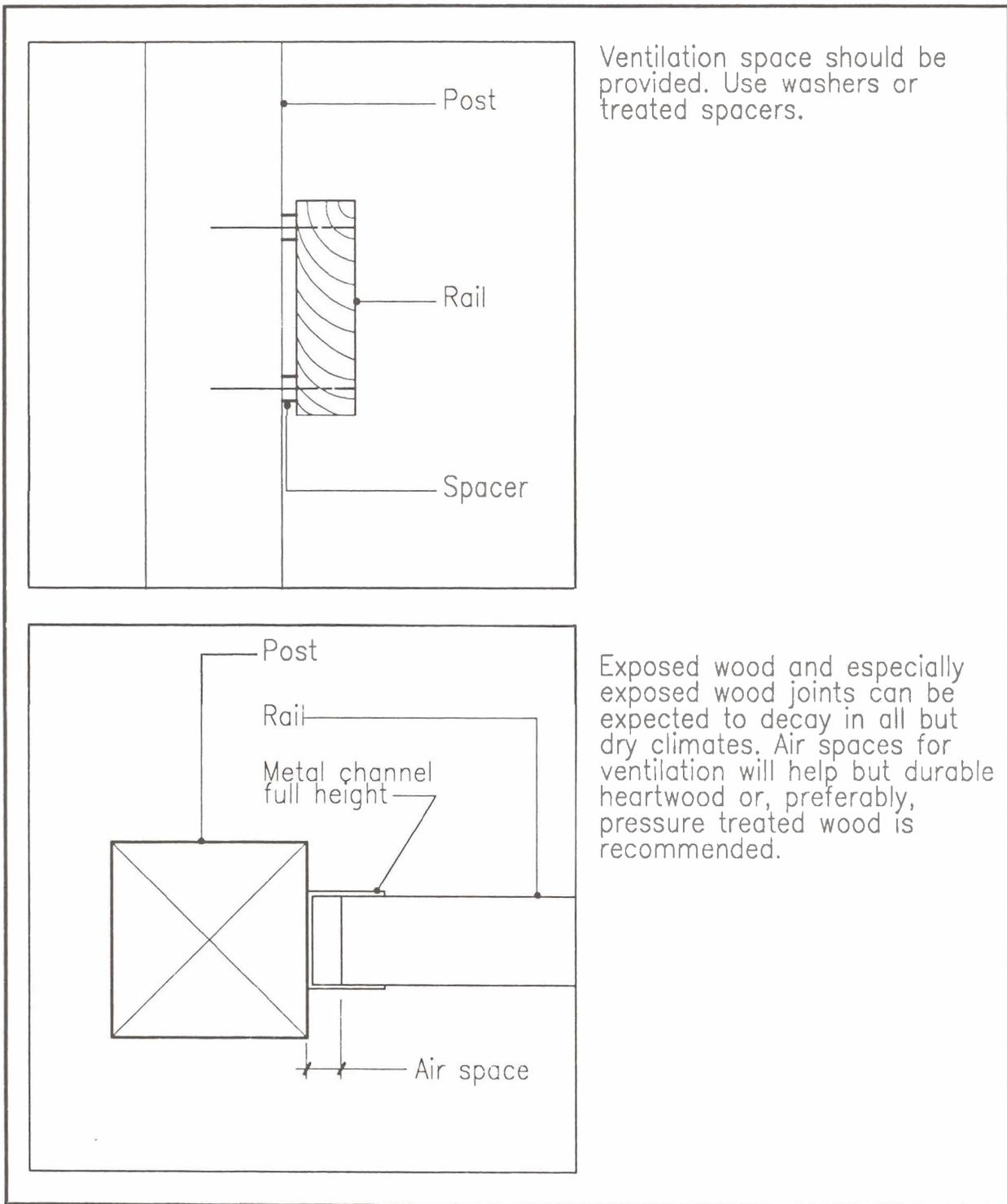
# EXPOSED DECK BOARD DETAIL

Figure 10-3



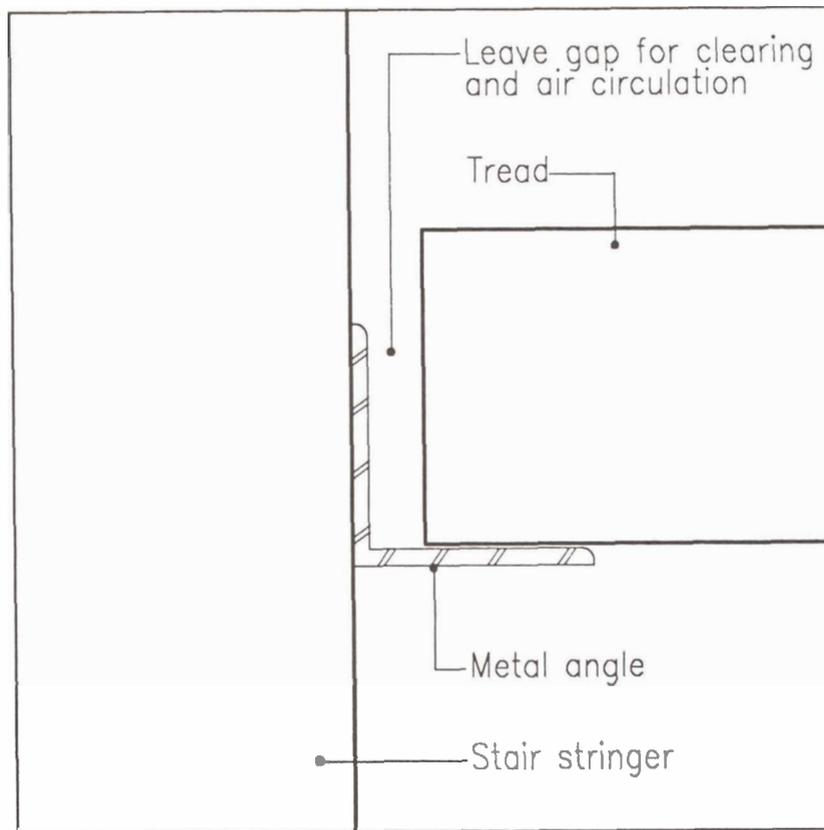
## EXPOSED DECK BUTT JOINT DETAIL

Figure 10-4



# EXPOSED JOINT POST TO RAIL DETAIL

Figure 10-5



Note: Pressure treated wood preferred  
for stair treads

## EXPOSED STAIR STAIR TREAD DETAIL

Figure 10-6