

INTRODUCTION

This book has two primary goals:

- To provide you with a sound introduction to the components, materials, and mechanics of house interiors that you will encounter and evaluate as a home inspector.
- To provide you with a solid understanding of inspection processes, strategies, and standards of practice that will help define the scope of your inspections. Specifically, the ASHI® (American Society of Home Inspectors) Standards of Practice are represented throughout.

The ASHI Standards are not the only standards for home inspectors, but they are widely used. Several states and other organizations have their own standards. The point is that standards help define a consistent scope of professional practice for home inspectors to use in their day-to-day work.

The depth of this book's discussion is sufficient to allow the general practitioner home inspector to perform a visual inspection. We are not shooting for service technician level, and there is always more material that you can study. Courses are available in many areas, and we encourage you to expand your knowledge and to keep up to date with local practices and requirements in your area.

FEATURES OF THIS BOOK

This book is structured to help you learn and retain the key concepts of home inspection. It also will help you form a set of best practices for conducting inspections. Learning features include:

- **Learning Objectives:** At the beginning of each chapter you will find a list of concepts you should master by the end of the chapter.
- **Chapter Review Questions:** Each chapter ends with a set of review questions to help you test your understanding. Answers can be found at the end of the book, so you can check your results.
- **Key Terms:** Important terms appear in boldface within the text discussions so that you can begin to understand them in context. A summary list of key terms appears at the end of each chapter.
- **Inspection Checklists:** These tools will summarize the important components you will be inspecting and their typical problems.
- **Inspection Procedures:** This material will help you develop a systematic approach and best practices for your inspections.
- **Standards of Practice:** ASHI has established a set of standards that are widely used to define the scope of inspection that practitioners should achieve.
- **Inspection Tools:** This summary list will help you build your toolkit of "must have" and optional tools for the job.



AN OVERVIEW OF INTERIORS

By the end of this book, you will be able to identify common problems with:

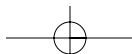
- floors
- walls
- ceilings
- trim, counters, and cabinets
- stairs
- windows, skylights, and solariums
- doors
- basement and crawlspace leakage

Clients Come with You

Although we always encourage clients to follow us on inspections, we find that they are most interested in being with us as we move through the interior. This is the area where they will have spent most of their time looking at the house, and most of their questions will be related to this area.

You will often be asked remodeling and renovation questions. You'll have to decide whether you are going to address these during the course of a home inspection. There is a fine line between being helpful and going beyond your scope. If you are going to offer renovation or remodeling advice, you might consider doing that as a separate service for a different fee.

As you inspect the interiors, you'll have to be careful to separate functional issues from cosmetic issues. Home inspectors deal with only the function side. Equally important, your client should appreciate the scope of your work.



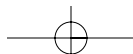
CHAPTER 1

FLOORS

LEARNING OBJECTIVES

By the end of this chapter you should be able to:

- list five common floor materials
- list five general flooring problems and their implications
- list seven concrete floor problems and their implications
- list six wood flooring problems and their implications
- list four carpet problems and their implications
- list five resilient flooring problems and their implications
- list five ceramic tile flooring problems and their implications



INTRODUCTION*Level, Smooth, and Durable*

Floors are designed as walking surfaces and supports for furnishings. Floors can also be part of the architectural appeal of the home.

From a traffic standpoint, floors should be level so they don't trip us, smooth so they're easy to navigate, and durable. Floors typically take more abuse than walls, and walls take more abuse than ceilings. Ceramic tiles designed for walls are not suitable for use on floors, for example.

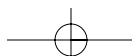
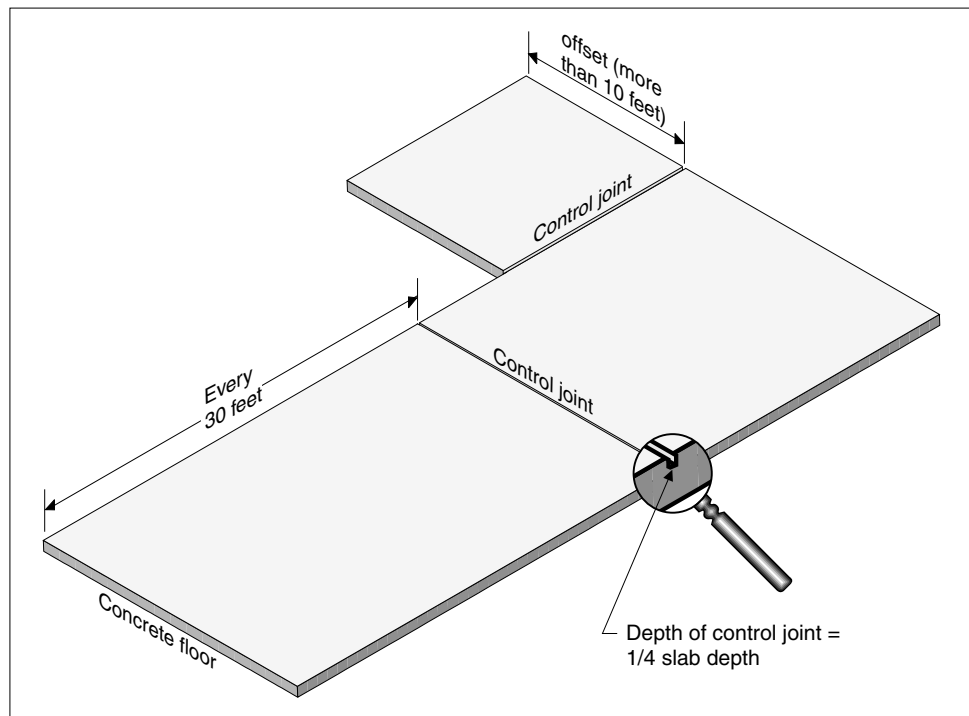
1.1 MATERIALS

Some of the common flooring materials are:

- concrete
- wood
- hardwood or softwood in strip, plank, or parquet styles
- carpet—wool and synthetic
- resilient—both tile and sheet goods
- ceramic and quarry tile
- stone and marble

Control Joints in Concrete Floors

Concrete floors can be rough, unfinished floors in basements or crawlspaces or can be immediately below the finished flooring in slab-on-grade construction. Concrete floors may have control joints to help ensure that any cracks develop where we want them to (Figure 1.1). Control joints are typically cuts in the surface

FIGURE 1.1 Control Joints in Concrete Floors

that are roughly a quarter of the depth of the slab. These cuts provide stress concentration points. If the slab cracks owing to shrinkage or minor settlement, the cracks will probably occur at the control joints. We can ensure that moisture penetration won't occur by protecting these joints during construction.

Every 30 Feet

Control joints are typically about every 30 feet in the slab and at offsets or changes in direction in the slab, especially if the offset is more than 10 feet.

Reinforced Slabs

If the concrete slabs have steel reinforcement, control joints are often omitted.

1.2 GENERAL STRATEGY

Home inspectors should always know whether they are walking across a wood floor or a concrete floor. This is something that you can learn to determine with experience by both the sound and the feel of the floor as you move across it. In some cases, you may have to bounce on the floor slightly to confirm your suspicions. Try this everywhere you go for the next few days. You'll find that it's relatively easy to do. It's slightly more difficult on ceramic tile floors because they are often wood flooring with a layer of concrete over them.

New Floors over Old

In some cases, new flooring material is laid over old. This is not unusual and may only be a matter of mild interest. However, in some cases, new flooring has been laid over old because of dramatic settlement or sagging in the old flooring. We have found homes where new flooring systems, including tapered joists, have been installed over old, badly sloping floors. This is not a problem in itself, but it should alert you to considerable movement of the structure. The important question is, "Has the cause of the movement been corrected?"

*Rot around Plumbing
Fixtures*

Rot is one of the biggest enemies of wood flooring. It shouldn't be a surprise that rot is most likely to attack wood flooring around and below sources of water. Although all plumbing fixtures can contribute, toilets are the most common problem area for wood floors. We find more rotted wood subflooring, joists, and beams around toilets than any other plumbing fixture (Figure 1.2).

Hardwood below Carpets?

We are very often asked whether there is hardwood flooring below wall-to-wall carpeting. You may be able to determine this by lifting heat registers or lifting corners of carpets. In many cases, the carpet is laid over subfloor. If there is hardwood below, you should caution your clients that it may not be in a suitable condition to remove the carpet and expose the hardwood. The carpet may have been installed because the hardwood was damaged. In older homes, hardwood can be sanded to create a new appearance. There is a limit to how often tongue-and-groove floors can be sanded. Modern $\frac{3}{8}$ -inch thick hardwood flooring can only be sanded once without risk of exposing the tongues. If your clients have their hearts set on hardwood flooring, they can install new hardwood flooring for only slightly more cost than high-quality carpet.

Let's look at some things that can go wrong with floors.

1.3 CONDITIONS

These are common flooring problems in houses:

1. Water damage
2. Trip hazard
3. Mechanical damage

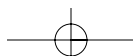
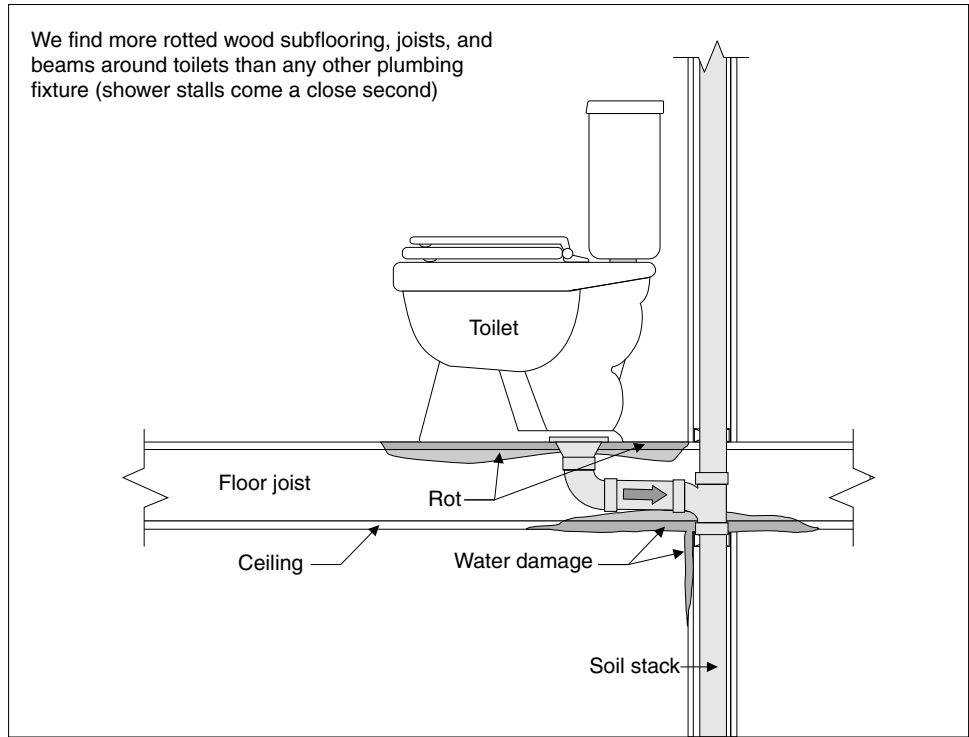
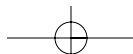


FIGURE 1.2 Rot around Plumbing Fixtures



4. Loose or missing pieces
5. Absorbent materials in wet areas
6. Concrete
 - cracked
 - settled
 - heaved
 - water penetrated
 - effloresced
 - sloped away from drain
 - hollow below
7. Wood
 - rotted
 - warped
 - buckled
 - stained
 - squeaks
 - exposed tongues
8. Carpet
 - rotted
 - stained



- odors
- buckled

9. Resilient

- split
- lifted seams
- open seams

10. Ceramic, stone, and marble

- cracked
- broken
- loose
- grout missing
- worn
- stained

Let's look at each problem more closely.

1.3.1 Water Damage

CAUSES

Water damage to floors can be the result of (Figure 1.3):

- roof or flashing leaks
- plumbing leaks
- heating leaks
- air conditioning leaks
- wall, window, or skylight leaks
- door leaks (especially sliding glass doors)
- spills from humidifiers, dehumidifiers, watering plants, aquariums, bathtubs, showers, sinks, basins, etc
- ice damming
- condensation
- melting snow from boots and winter clothing
- careless floor washing

IMPLICATIONS

The implications of water damage may be:

- cosmetic only if the source of water has been contained
- rotting, staining, or other damage to the floor finish
- rotting or other damage to structural components

STRATEGY

Where you see staining, buckling, warping, rotting, efflorescence, or wet spots, you should be looking at several things:

- Is the damage localized or widespread?
- Is there concealed damage? This may be difficult to determine, but you should allow for the possibility.
- What is the source of the water? Again, this may be difficult to tell, especially if the problem is not active.

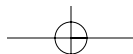
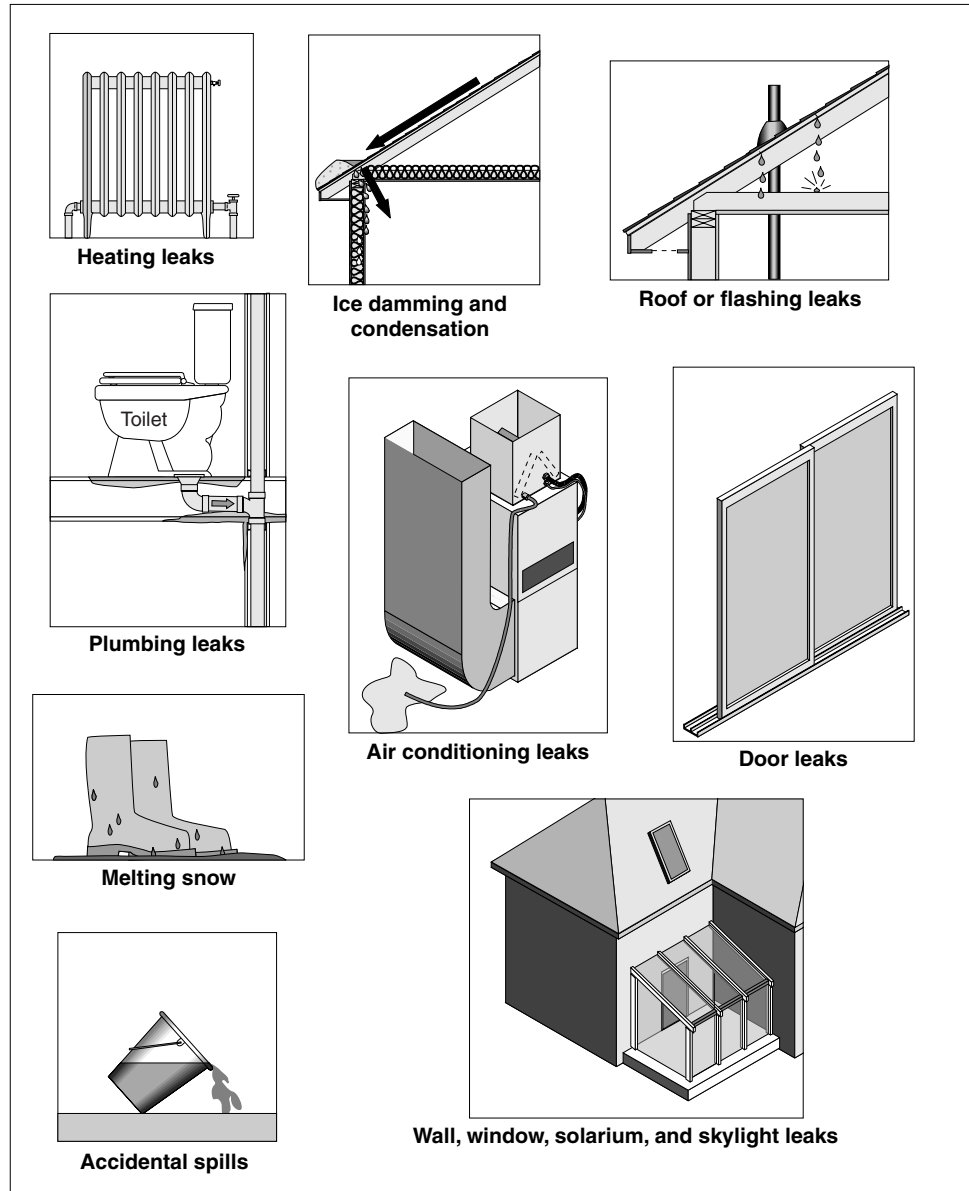


FIGURE 1.3 Sources of Interior Water Damage

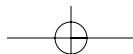


- Is the leak active? If the floor is wet or damp, this is an easy answer. If the floor is dry, the problem may be inactive or intermittent. If it's a roof leak, for example, the floor may only get wet during and after a heavy rain. It may only be after a heavy rain accompanied by wind from a particular direction.

Don't Speculate

Your role as a home inspector has been satisfied once you've identified the problem and let the client know the possible implications. You don't have to troubleshoot the problem. You should give the client some direction. Your recommendations may include more than one of these actions:

- repair the floor
- correct the leak



- investigate further
- monitor the situation

1.3.2 Trip Hazard

CAUSES
IMPLICATIONS
STRATEGY

Uneven floors create trip hazards.

The implication of trip hazards is personal injury.

Look for unevenness in floor systems. Sometimes you'll discover these quite accidentally.

1.3.3 Mechanical Damage

CAUSES
IMPLICATIONS

Damage to floors may include mechanical damage due to heavy objects being dragged across floors, impact damage, or burns. Again, we aren't worried about cosmetics but are interested in performance issues.

Mechanical damage may create unevenness that results in trip hazards. It may result in a loss of continuity in a flooring system. Cuts in resilient flooring in kitchens or bathrooms, for example, can allow water into subflooring. Look for evidence of mechanical damage in exposed flooring. Remember that in a furnished house, you are not going to see the entire floor. Let your clients know that things may look very different when they take possession of the house when it is vacant. Most houses look considerably worse with no furniture.

1.3.4 Loose or Missing Pieces

CAUSES
IMPLICATIONS
STRATEGY

Pieces of flooring may have come loose and been lost. This is particularly true of parquet flooring and ceramic tile, for example.

This is usually a result of failed adhesives, mechanical damage, or poor installation.

The implications include trip hazards and moisture penetration to subflooring. There are also cosmetic issues.

As you walk across floors, look and feel for loose pieces, particularly with wood parquet flooring and ceramic tile, stone, or marble flooring. Many inspectors tap on parquet floors and ceramic tile floors to help identify pieces that are coming loose.

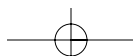
1.3.5 Absorbent Materials in Wet Areas

CAUSE
IMPLICATIONS

This is somewhat subjective but is a commonsense issue. The classic example is carpeting in bathrooms. Floors in rooms that are likely to get wet should have non-absorbent, moisture-resistant flooring materials.

This is an installation choice.

Premature deterioration of the flooring is one implication. Rot damage to subflooring is another. Odors and other indoor air quality issues may create health concerns.



STRATEGY

We look closely for evidence of problems with flooring or subflooring where we find absorbent materials in kitchens and bathrooms. Wood flooring is marginally acceptable, although, again, the potential for moisture damage is considerable.

You may not want to recommend removal of a flooring system, but you should alert your clients to the disadvantage of the situation.

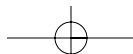
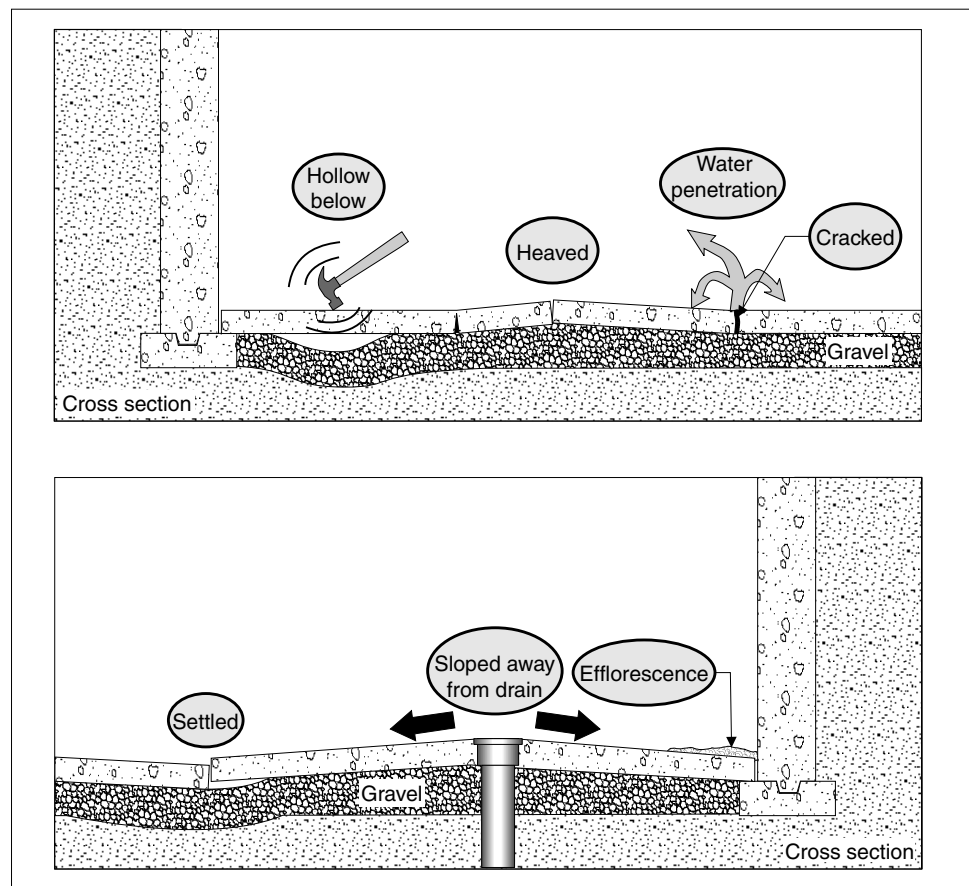
Alert Your Clients

1.3.6 Concrete Floors

Figure 1.4 summarizes the conditions that occur in concrete floors. They can be:

- cracked
- settled
- heaved
- water penetrated
- effloresced
- sloped away from drain
- hollow below

FIGURE 1.4 Concrete Floor Problems



CAUSES

Cracking
Settling

Heaving and Water Penetration

Slope at Drains
Hollow Areas—Erosion?

IMPLICATIONS

Cracks

Settled or Heaved

Water and Efflorescence

Slope Away from Drains

Hollows May Be Serious

STRATEGY

Cracks, Settling, and Heaving

Water and Efflorescence

Hollows

Concrete floors can be the main floor in slab-on-grade construction or may be a rough, unfinished floor in a basement or crawlspace area. There will be concrete floors below most raised or finished flooring in basement areas as well.

Most concrete floors crack as a result of shrinkage during curing.

Floors may settle as a result of inadequate support from the substrate below (building on disturbed soil, for example) or excessive loads (from a column without a footing, for example).

Floors may heave as a result of frost below the floor or hydrostatic pressure from a high water table. Water or efflorescence coming up through floors indicates hydrostatic pressure below. This means the area below the slab is saturated with water and is under some pressure.

A floor that slopes away from a floor drain is an original installation issue.

Floors that are hollow below may be the result of poor original construction or sub-slab erosion. The erosion may be the result of surface water or underground streams.

The implications of shrinkage cracks are usually not significant. Water and/or efflorescence may appear at the cracks if there is hydrostatic pressure below.

Settled or heaved slabs may indicate structural problems or local problems of little significance. The extent of movement is the best clue as to the severity. Settled and heaved slabs may also be trip hazards.

Water and efflorescence may result in damage to finishes and to the structure. Again, it's a question of the extent and amount of water.

Floors that slope away from drains suffer more damage to finishes and structures when floors get wet. Floor drains are typically only found on below-grade concrete floors. This is primarily a basement issue.

Floors that are hollow below may be trivial if the hollow is localized and less than $\frac{1}{2}$ inch, for example. Hollows below concrete floors may also indicate serious erosion and structural problems. It's important to know your local soil conditions and any possibilities of sink holes or unusual features.

Where floors show typical random shrinkage cracking, no action is typically necessary. Where cracks are accompanied by settlement or heaving, the location and direction of the cracks may be important. Does the pattern suggest a sinking foundation or heaving column, for example? The extent of movement and the age of the building are valuable clues. In most cases, you won't be able to be conclusive about whether the movement is ongoing based on a one-time visit. However, a $\frac{1}{2}$ -inch movement in a 1-year-old house is far more likely to be significant than in a 100-year-old house. It's often hard to know whether you should be reassuring or alarmist about settled or heaved concrete floors. Common sense tells you to be neither. Document your findings. Explain the limitations and possible implications. Recommend monitoring if the problem is mild and further investigation if the movement is extensive.

Use a similar approach for evidence of water and/or efflorescence at cracks. Remedial actions may include a sump and pump. It helps tremendously to know local conditions. Are you in an area with a high water table? Is this a seasonal problem associated with melting snow and spring runoff? Is the problem specific to the house because of poor control of roof and surface rainwater?

Hollow spaces below floors should be treated much like settled or heaved floors (Figure 1.5). You can't usually be conclusive about the size and severity of voids below floors. You won't know whether there is progressive erosion or movement

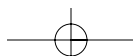
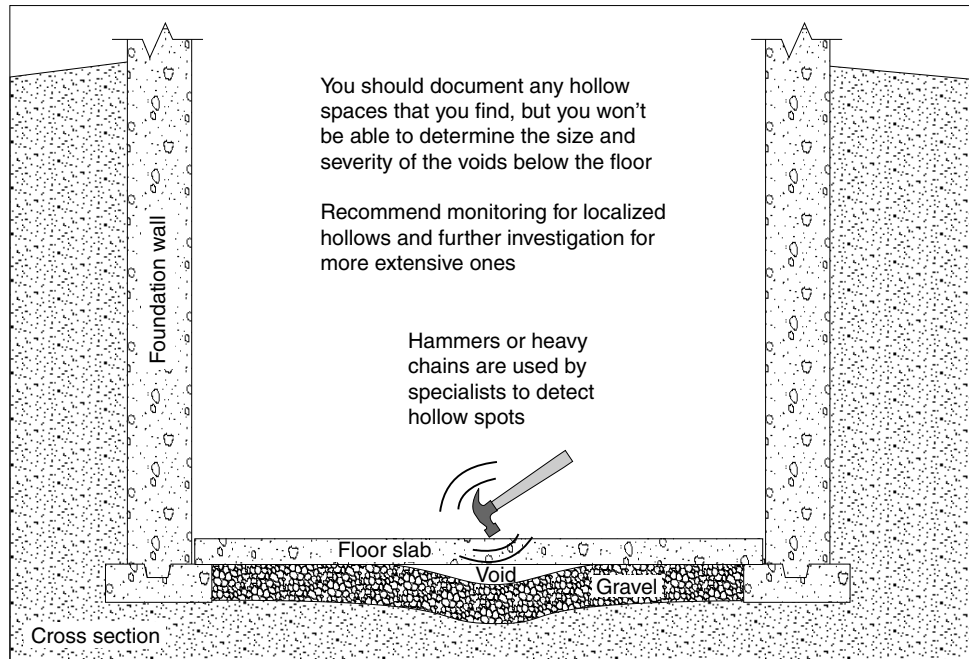


FIGURE 1.5 Hollows



of the soil below or whether it's simply an original construction condition that won't get any worse. Again, document your findings, explain the possible implications, and recommend monitoring if the condition is localized (1 or 2 square feet). Recommend further investigation if the hollow spaces are more extensive.

1.3.7 Wood

- Rotted
- Warped
- Buckled
- Stained
- Squeaks
- Exposed tongues

CAUSES

Squeaks

Exposed Tongues

Rotted, warped, buckled, or stained floors are the result of water damage. We talked about several possible sources of water damage. Wood is vulnerable to rot attack when the moisture content is above 20 percent (Figure 1.6).

Squeaks are typically caused by finished flooring not being held tightly against subflooring or subflooring not sitting tightly against joists.

Exposed tongues on tongue-and-groove flooring are usually the result of sanding the floor to create a new wood finish.

The implications of rotted, warped, buckled, or stained flooring include—

- cosmetic problems
- trip hazards
- deterioration of the structure below

IMPLICATIONS

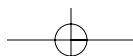
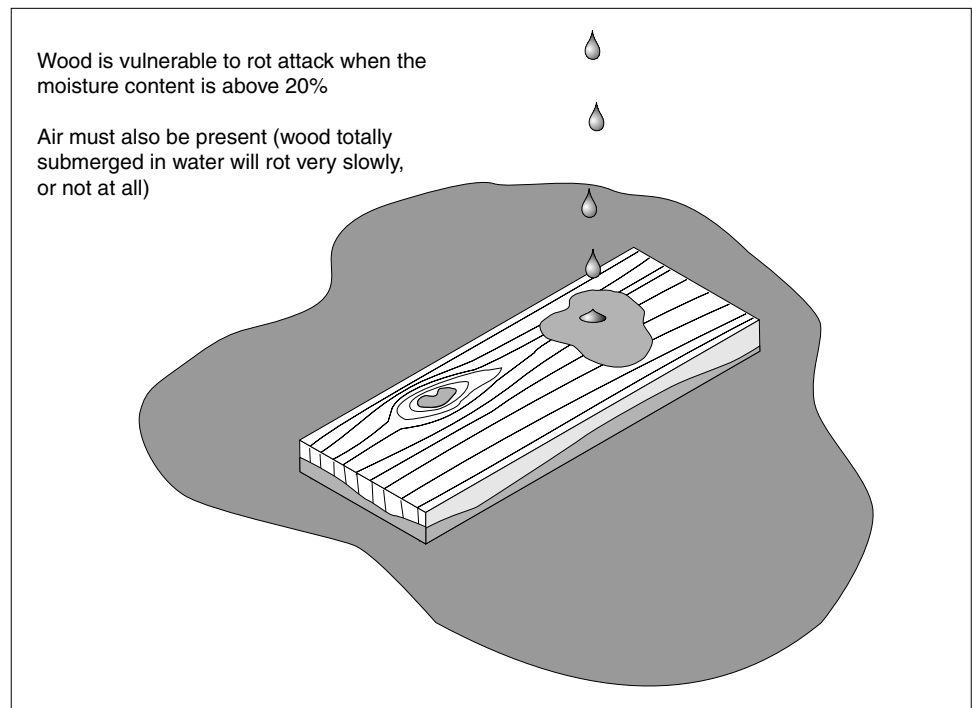


FIGURE 1.6 Causes of Rot

Squeaks

Exposed Tongues

STRATEGY

*Rotted, Warped, Buckled,
Stained Floors*

Toilets

Squeaks

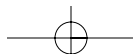
The implications of squeaks are simply a nuisance. Squeaks do not indicate structural problems.

Exposed tongues may result in slivers or splinters for people walking in bare or stocking feet. They may also result in exposed nail heads and possible injury. There are obvious cosmetic implications, and pieces of flooring may become loose and/or lift as a result.

Look for stained, warped, buckled, or rotted flooring. Pay particular attention to areas below sliding glass doors and windows. Leakage and condensation can combine to cause considerable damage in these areas.

Look closely in kitchens and bathrooms for evidence of problems, but focus around toilets. Where possible, go to the floor level below and look up to see if there is evidence of damage to flooring or to ceilings or structural members below the flooring around the toilet. Depending on the extent of the damage and whether the problem is active, you may recommend leakage or condensation control measures and flooring replacement. You may also recommend structural repairs.

The first step is to reassure clients that squeaks are common and are not a performance issue. Solutions for correcting squeaks include pulling the finished flooring down against the subflooring and/or pulling the subflooring down against the joists. This can be done from above or below. In many cases, a cost/benefit analysis convinces people to live with the squeaks.



1.3.8 Carpet

- Rot
- Stains
- Odors
- Buckled

CAUSES

Buckled

IMPLICATIONS

Buckled

STRATEGY

Look for Moisture

Buckled

Rot, stains, and odors may be the result of water problems. Stains and odors can also be the result of spills and/or pets.

Buckled carpeting may be an installation or moisture issue.

The implications of rot, stains, and odors may be cosmetic. They may also indicate damage to subflooring and framing below. There may be health implications to stains and odors.

Buckled carpeting is a trip hazard.

When rot, stains, and/or odors are noted, the first step is to determine whether moisture is still present. Again, if dampness is found, you can be conclusive. If the carpet is dry, the problem may be intermittent. You may be able to distinguish between pet odors and general dampness. You may want to recommend further investigation. Carpets that are stained or have odors may have to be replaced. The odors may be in the subflooring as well. There are chemicals that can be used to eliminate these odors. In severe cases, some of the subflooring may have to be replaced. Where rot is noted, structural members below may be damaged.

Look for carpeting that has lifted up at the middle or edges and may be a trip hazard. Recommend that this be stretched and resecured.

1.3.9 Resilient

- Split
- Lifted seams
- Open seams

CAUSES

IMPLICATIONS

STRATEGY

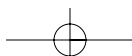
These problems are typically mechanical damage or poor installation issues.

Water damage to the subflooring below and trip hazards are the functional implications.

Look for splits or tears in resilient flooring. Open or lifted seams are more common on tile floors than sheet goods simply because there are more seams. Sheet goods typically come in rolls 12-feet wide, and there may be no seams in kitchen or bathroom floors.

1.3.10 Ceramic, Stone, and Marble

- Loose
- Grout missing
- Cracked or broken
- Worn
- Stains



CAUSES

Tiles that are cracked, broken, or loose or have missing grout may result from:

- excessive deflection of the substrate
- improper installation, including surface preparation, mortar amount and quality, and grout amount and quality

Worn

Worn tile may be the result of:

- normal wear and tear
- mechanical damage (heavy appliances being dragged across the floor, for example)
- the use of wall tiles on floors (wall tiles are not as durable)

Stains

Stains are typically the result of spills.

IMPLICATIONS

Cracked, broken, or loose tiles and tiles with grout missing can lead to water damage to the subfloor and may present trip hazards. Worn tiles may only be cosmetic issues, but they can be trip hazards if corners are broken or pieces are loose.

Stains

Stains are typically cosmetic issues only.

STRATEGY

Look for stains and wear and tear. You may be able to see missing grout and cracked or broken tiles. Tapping on tiles also helps to identify loose pieces.

Conventional Flooring

Houses are designed with floor systems that have a considerable amount of deflection. Without special consideration, ceramic tiles over conventional wood floors in houses will often crack. In most cases, this is only a cosmetic problem, unless the tiles become loose. Proper installation techniques typically include one of these four options (Figure 1.7):

- A 1¹/₄-inch mortar bed on top of the wood subfloor below the tile
- 3⁴/₄-inch plywood flooring plus 1⁴/₄-inch underlay below the tile
- A double layer of 5⁸/₈-inch plywood or waferboard subflooring below the tile
- Conventional (5⁸/₈-inch-thick) subflooring with two-by-two blocking between joists. The blocking should be 8 inches on center if the joists are 16 inches on center.

The Thinset Alternative

We find many cases where ceramic tile is installed on a 1⁴/₄- to 1²/₂-inch-thick mortar bed that contains a wire mesh reinforcing lath, all over 5⁸/₈-inch plywood. Two sets of diagonal bridging for each joist pair is all the stiffening that is used. Depending on a number of factors, this approach sometimes works. It is more likely to be successful where joist spans are short or there is 12-inch rather than 16-inch joist spacing.

Use Test of Time

Where you see this configuration on a 20-year-old home and there is no cracking on the grout or tile, you can be comfortable that the system has been successful. In a 1- or 2-year-old house, you are going to want to be more cautious and say that the installation technique is typical, but not ideal. Cracking of tiles or grout may occur. Point out that this is a cosmetic issue.

Checking the Floor

The easiest way to determine how the ceramic tile has been laid is to remove a floor register on a forced air system. Where this can't be done, you may be able to get a look at the floor around edges or at penetrations for plumbing pipes, for example.

Performance-Based Inspection

Where you can't determine exactly how the tile floor has been laid, you can safely default to looking at the condition of the floor. Are there cracked, broken, or loose tiles? As long as you document the condition of the floor and your limitations in looking at it, you have done your job. The ASHI Standards say we don't

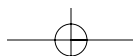
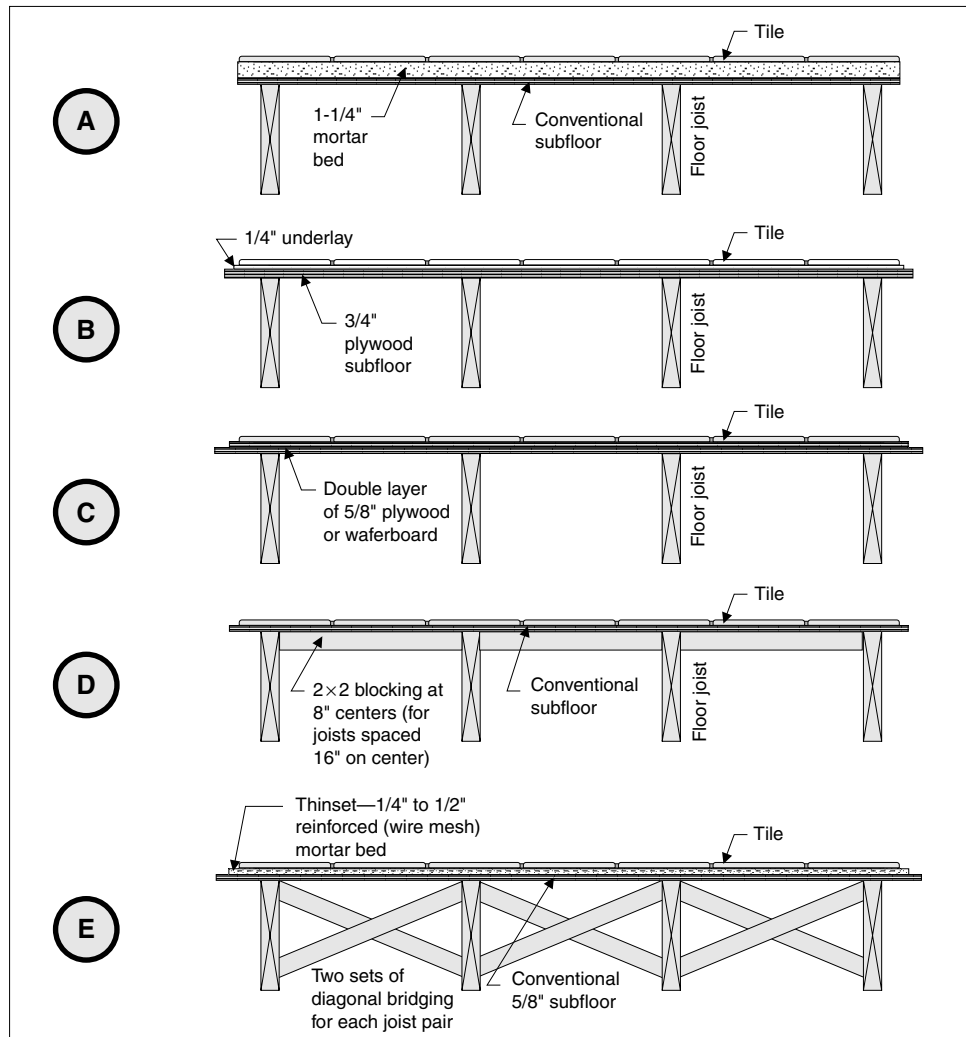


FIGURE 1.7 Alternatives for Installing Ceramic Tiles

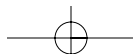


have to lift carpets. A throw rug in a kitchen or bathroom may cover cracked tiles. Many inspectors will move these carpets to look at ceramic tiles below.

CHAPTER REVIEW QUESTIONS

Instructions: Answer the following questions on a separate sheet of paper, then check your results against the answers provided in Appendix E. If you have trouble with a question, refer back to the chapter to review the relevant material.

1. List five common flooring materials.
2. List five general problems with floor systems and their implications.
3. List five concrete flooring problems.
4. List six wood flooring problems and their implications.
5. List four carpet problems and their implications.



6. List three resilient flooring problems and their implications.
7. List five ceramic floor problems and their implications.
8. What is a control joint on a concrete slab?
9. Where is rot most likely to occur on a wood frame flooring system?

KEY TERMS

concrete
wood
carpet

resilient
ceramic
trip hazard

absorbent material
squeaks

