

INTRODUCTION

THE EXTERIOR COMPONENTS OF A BUILDING WORK TOGETHER TO PROVIDE A WEATHERTIGHT SKIN, IF ALL THE PARTS ARE DOING THEIR JOB. PROTECTION AGAINST INTRUDERS, BOTH ANIMAL AND HUMAN, IS ALSO OFFERED BY THE BUILDING SKIN. GOOD EXTERIORS ARE ATTRACTIVE, DURABLE AND REQUIRE LITTLE MAINTENANCE. EXTERIOR COMPONENTS ARE OFTEN THE MOST NEGLECTED PARTS OF A HOME.

1.0 Gutters and Downspouts

DESCRIPTION Gutters and downspouts have two major functions. Firstly, they protect the walls of a building from water that would ordinarily run off the roof. This water can damage the wall surfaces and cause localized erosion at ground level.

The second and most important function of gutters and downspouts in homes with basements or crawlspaces, however, is helping to ensure a dry basement. (We'll say basements to mean both basements and crawlspaces in this section.) Regardless of the foundation type, there is always the risk of water penetration. The less water there is in the soil near the foundation wall, the lower the risk of water penetration into the basement. Gutters should collect all water run off, and downspouts should discharge the water into proper drains or onto the ground well away from the foundation walls.

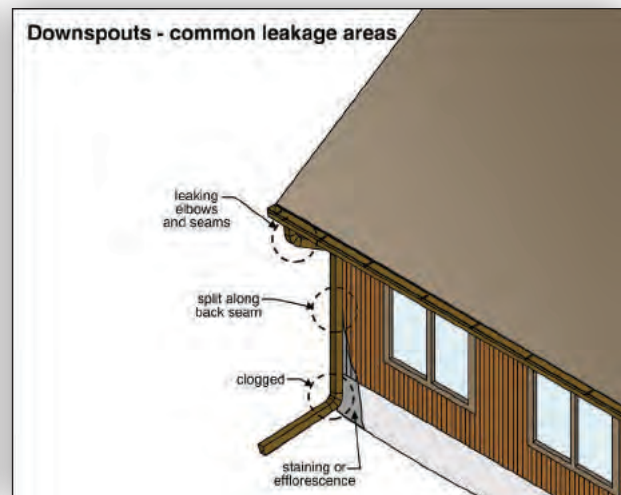
SIZE On most houses, the gutters are attached to the fascia board at the edge of the eaves. In some houses, gutters are integral to the design of the eaves. The two most common sizes of gutters are four-inch and five-inch widths. Four-inch gutters are good for relatively small roof areas; however, five-inch gutters are preferred because of their additional capacity. Five-inch gutters are also less likely to allow water to overshoot the gutters when the water is draining off a steeply pitched roof.



- MATERIALS** Gutters can be made of several materials; however, the most common are aluminum, galvanized steel, plastic and copper. Integral gutters are usually framed in wood, and lined with metals such as lead or copper. There are advantages and disadvantages to the various materials used.
- ALUMINUM** Aluminum gutters do not rust but they dent easily, particularly with tall, heavy ladders. Joints in aluminum gutters are usually riveted together and caulked. The caulking must be renewed every few years. Aluminum gutters usually have very few joints, since the gutters are typically fabricated on the job site from long rolls of aluminum stock. Aluminum gutter is also pre-finished and does not require regular painting. Life expectancy is estimated to be 20 to 25 years.
- GALVANIZED STEEL** Some galvanized steel gutters are also pre-finished but most are not. Galvanized steel requires periodic painting. Joints in galvanized gutters are usually soldered together. This type of gutter has a 20 to 25 year life expectancy.
- PLASTIC** Plastic gutters are generally designed for the do-it-yourselfer. Plastic comes in a limited color selection and some types tend to discolor with time. Plastic gutters are usually relatively small and some of the earlier systems are prone to cracking during cold weather. The life expectancy is dependent upon the quality of the kit and the installation.
- COPPER** Copper gutters are considered to be the best; however, they are very expensive and not common. Copper can last 50 to 100 years.

Common Problems with Gutters and Downspouts

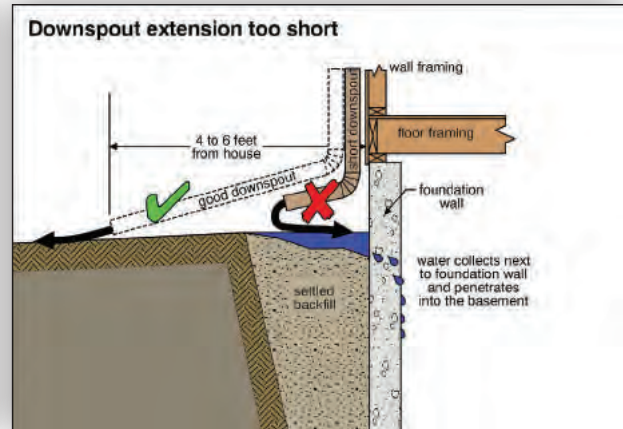
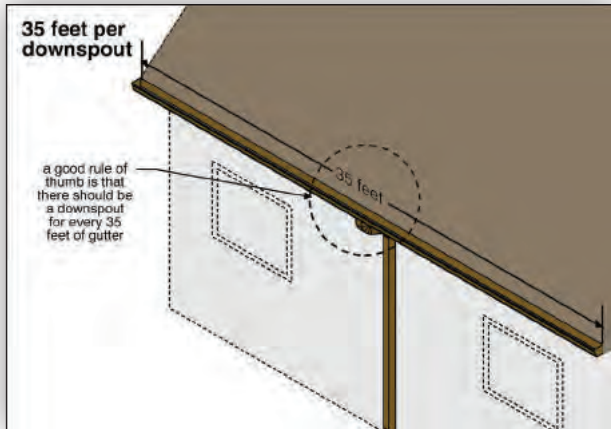
- LEAKAGE – HOLES/SEAMS/ END CAPS** The most common problem with gutters is leakage. Leakage will occur with galvanized gutters as they rust through. Holes can develop in copper gutters as well. All gutters are prone to leakage at the joints and seams. Missing end caps and poor connections to downspouts are other common sources of leakage. Leakage can cause considerable damage to fascias, soffits and walls below. Leaks can also result in basement water problems.



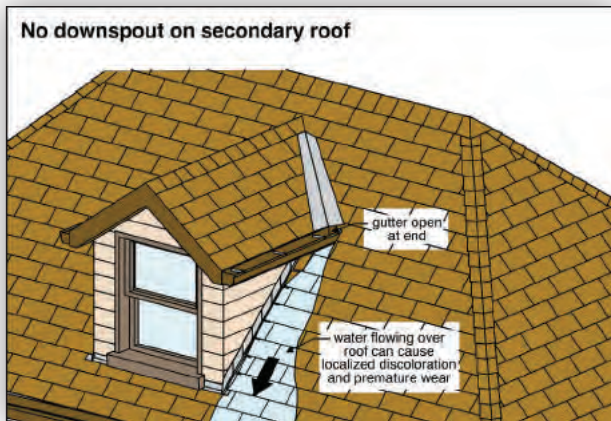
- LOOSE** Gutters and downspouts may become loose and require re-securing. This is normally due to improper fastening during original installation or damage caused by snow and ice during winter months. Downspouts can become disconnected from gutters.
- DAMAGED/OLD** Gutters and downspouts suffer from mechanical damage due to ladders, tree limbs, and the like. Downspouts tend to split open at the seams (from freezing in cold climates). The seam is usually against the wall and the split may go unnoticed. Downspouts along driveways or sidewalks are sometimes crimped. Aluminum gutters and downspouts are more easily damaged than galvanized steel. Galvanized steel downspouts often rust near grade level or where blockages have occurred. Galvanized gutters and downspouts eventually rust through.
- PAINT** Galvanized steel gutters and downspouts should be painted regularly to prolong their life. Although not often done, some say painting the inside is as important as painting the outside. Special paints are sometimes used inside gutters since they are often wet for considerable periods of time.
- POOR SLOPE** Gutters should slope properly towards downspouts to drain water.
- CLOGGED** Gutters and downspouts often clog with debris. Screens or deflectors are sometimes installed to prevent leaves and twigs from getting into the troughs. These rarely work well. They become loose and often fall out. They also make cleaning more difficult. Special screens are available for the top of downspouts to prevent the entry of debris. These work better, but must be cleaned regularly.
- NUMBER OF DOWNSPOUTS** On many houses, the number of downspouts is inadequate. As a general rule, a downspout should be provided for every 35 to 40 feet of gutters.
- DOWNSPOUT DISCHARGE** Downspouts collect water from the gutters and discharge it into drains or onto the ground. Underground drains (usually made of clay tile, cast iron or plastic) become clogged or break below grade. If an underground downspout malfunctions, water problems will likely develop in that part of the basement. There are two options. Exterior digging and repairs can be undertaken; however, it is faster and cheaper to simply disconnect the downspout and redirect it to discharge away from the house. It's also easier to monitor the performance, and problems are corrected easily.

Downspouts should discharge above grade onto the ground at least six feet from the home. The slope of the ground in this area should be away from the house, to direct water away from the basement.

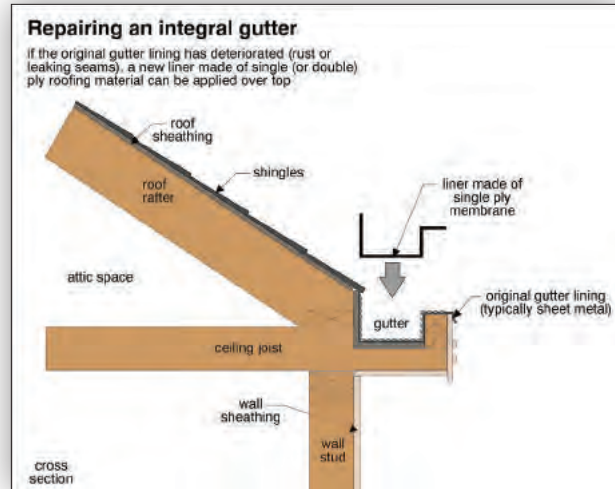
On older homes, (pre-1950) downspout drains are often connected to floor drains in the basement. If there is a significant amount of debris in the discharge from the downspouts, it can plug the basement floor drains and cause backup. A more complete discussion of wet basement problems is included in Section 10 of the Interior chapter.



DISCHARGE ONTO ROOF Where gutters or downspouts discharge onto roof below, the lower roof in the path of the water will deteriorate quickly. The lower roof can be protected by extending the downspout along the lower roof to discharge directly into the lower roof gutter.



INTEGRAL OR BUILT-IN GUTTERS Malfunctioning integral gutters can be very serious. The leaking water usually ends up in the structure, causing rot and other damage. Repairs often include adding a single-ply roofing membrane as a gutter liner.



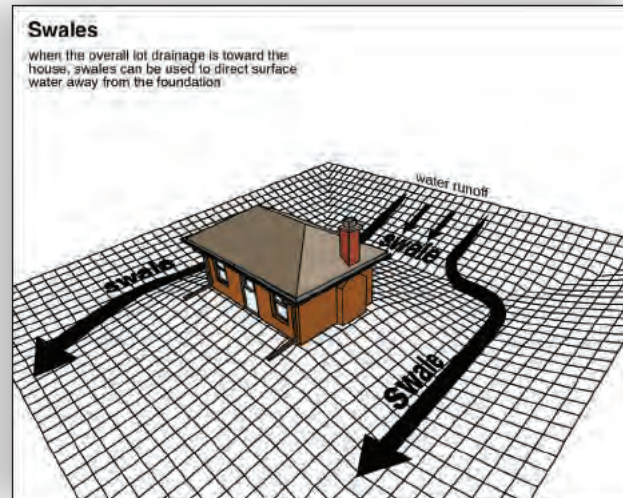
2.0 Lot Grading

DESCRIPTION Proper lot grading is an important consideration when dealing with wet basements. No foundation wall system is completely waterproof. Water accumulating in the soil outside the building will usually leak through eventually. The secret is to keep the soil outside the building dry. If the ground around the building slopes so that surface water runs away from the building, soil close to the foundation is dry and the basement is far less likely to leak.

Common Problems with Lot Grading

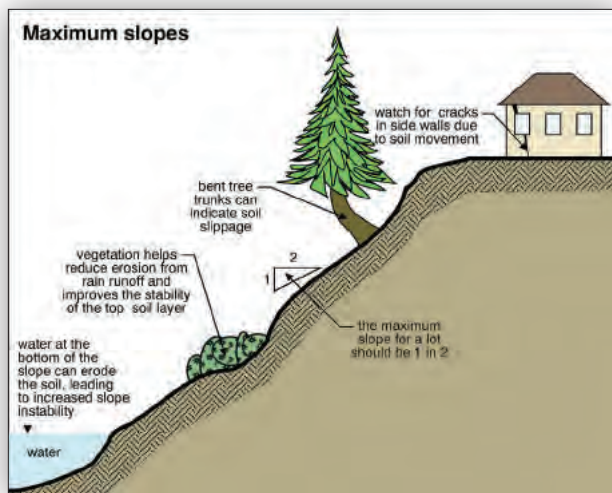
WET BASEMENTS The theory is simple. If there is no water in the soil on the outside of the foundation wall, no water will get into the interior. Most wet basement problems can be eliminated or dramatically reduced with good grading and proper performance of gutters and downspouts. The ground around the home should slope down six inches for the first ten feet away from the home. This can often be done by adding topsoil (not sand or gravel).

Where the general topography directs water towards the house, further measures are sometimes required. A swale (a shallow ditch with gently sloped sides) may have to be constructed to divert water run off around the house to areas that are lower-lying.



If the general topography of the neighborhood is such that the house lies in the lowest area, grading improvements may improve the situation; however, further measures may be necessary. See Section 10 of the Interior chapter for more information on wet basement problems.

RAVINE LOTS Ravine lots have potential erosion problems, which can have catastrophic effects. Erosion can compromise the structural integrity of the house if the tableland keeps disappearing.



From a one-time visit, it is not possible to determine the rate of erosion (if any); however, mature trees and heavy vegetation on the slope suggest little movement and their roots help prevent erosion.

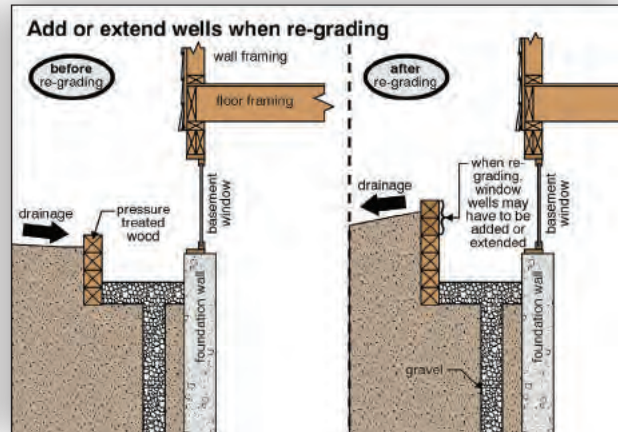
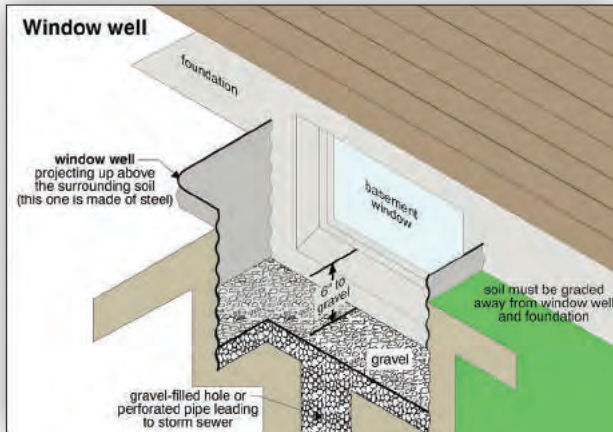
To prevent continuing problems, a soils engineer and/or landscape architect should be engaged to design retaining walls or other systems to hold back the earth, where erosion is noted.

2.1 Window Wells

DESCRIPTION Window wells are created with small retaining walls that keep the earth away from windows that are at or below grade. Window wells may be concrete or a corrugated steel shell. Chemically treated wood is sometimes used; however, it should be avoided in termite prone areas.

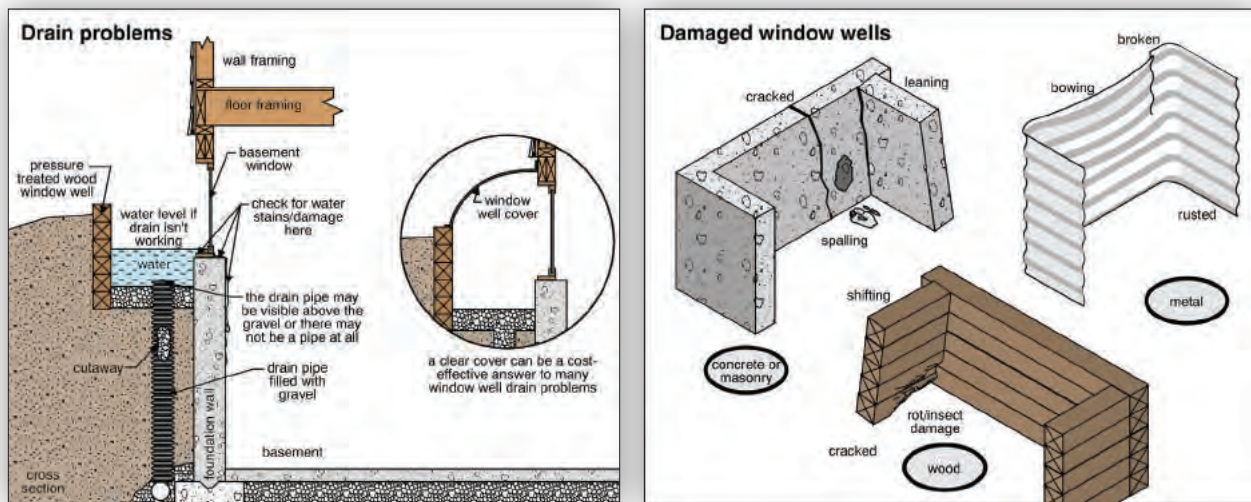
Window wells should be large enough to allow light in and should allow for easy cleaning of the window and well. Re-grading work to drain surface water away from the home may create the need for window wells, as the grade level is often raised around the foundation.

DRAINAGE AND COVERS Ideally, the bottom of the window well should contain several inches of gravel to allow water to drain from the well. A drainage pipe, filled with gravel (to prevent it from collapsing, but still allowing water to pass) should extend down to the drainage tile around the perimeter of the footing (if one exists). As an alternative, a clear plastic dome cover is installed over the window well to keep water and debris out.



Common Problems with Window Wells

Wells may be missing or too shallow to protect the window. They may be clogged with debris (a maintenance issue) or they may not drain properly, even when clean. Wood rots, metal rusts and concrete spalls. Nothing is forever.



3.0 Wall Surfaces

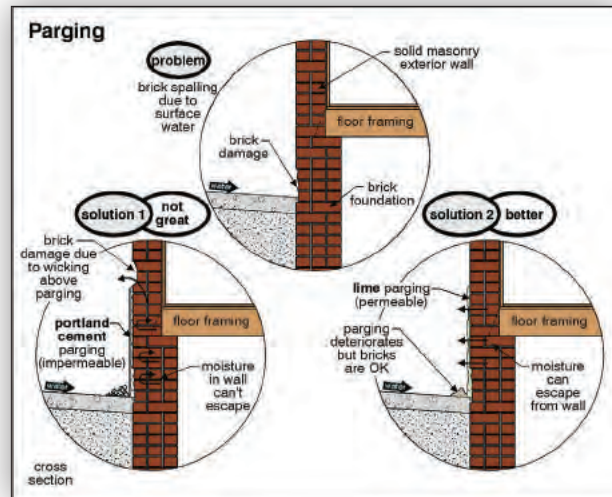
DESCRIPTION Wall finishes protect the building skeleton and interior from weather and mechanical damage. In some cases, the wall surfaces enhance the structural rigidity of the building (e.g. houses constructed of solid masonry, or log houses). We will start by looking at some issues common to many types of siding and then look at individual materials.

3.1 Common Problems with All Wall Systems

FOUNDATIONS: Foundation walls may be poured concrete, concrete block, cinder block, stone, brick, clay tile or wood. Mortar repair (re-pointing) is often necessary on the above grade portion of masonry foundations. Cracks in poured foundations should be patched. Spalling concrete or masonry can be replaced or parged.

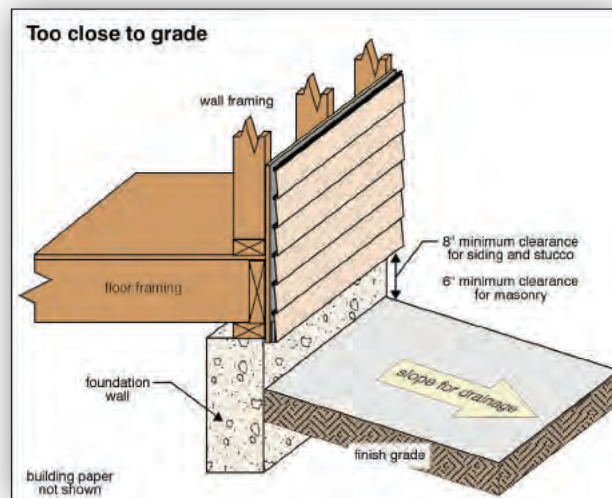
FOUNDATIONS: Sometimes, the exposed foundation wall is parged (covered with a thin layer of concrete). **PARGING** This is necessary on porous foundations such as brick or concrete block. It is not uncommon for the parging to separate from the foundation wall and break off. Localized patching of deteriorated parging is easily undertaken. If, however, large-scale deterioration or separation has occurred, removal and re-parging will be required. Expanded metal lath (of the non-rusting variety) should be secured to the foundation wall to provide a good base for the parging in areas where adhesion is questionable.

Lime based parging is better than Portland cement based because it is more permeable. Impermeable parging breaks off in large sections, due to moisture trapped behind it. The impermeable parging also causes dampness to rise up the wall to a level above the parging where evaporation can take place. Evaporation results in efflorescence (defined on Page 12) forming on the wall surface and within the wall itself. This causes spalling brickwork and mortar deterioration. Lime-based parging prevents this phenomenon from happening as moisture can pass through it. The parging itself is subject to efflorescence and spalling, but this is treated as sacrificial material.



SIDING TOO CLOSE TO GRADE

Siding materials are not meant to be in contact with the ground and will deteriorate if they are at or below grade. On virtually every house, at least the top four to six inches of the foundation wall should be visible outside. We prefer to see six inches for masonry and eight inches for wood siding. There are two reasons – the first is that siding may deteriorate from chronic dampness. The second is the risk of rot and/or insect infestation to the structure. Even brick homes have wood structural members inside.



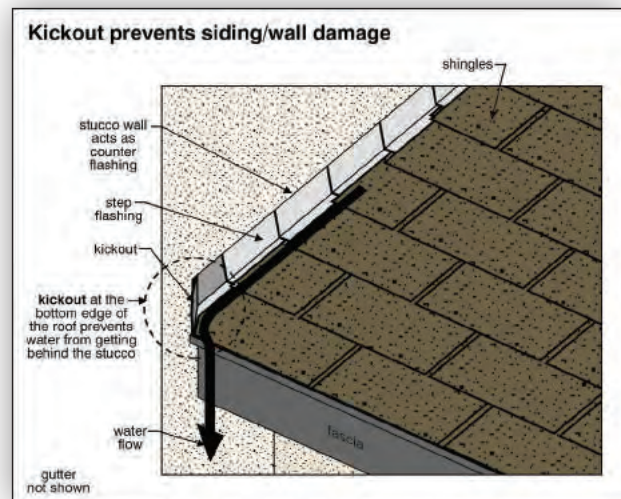
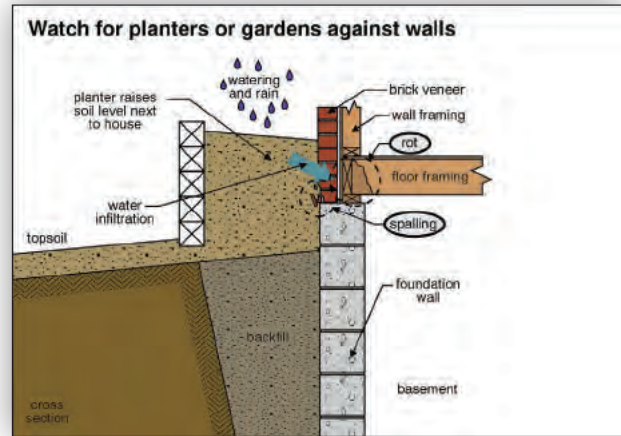
PLANTERS OR GARDENS AGAINST WALLS Even if the grading around the house is fine, there may be problems from raised planters or gardens with soil against the house wall. These can cause considerable damage to the house. Planters and raised gardens should be kept away from the wall.

SIDING TOO CLOSE TO ROOF BELOW Most siding materials deteriorate if they are chronically wet. These materials should stop roughly two inches above roof surfaces below. Where they do not, the siding may fail prematurely.

NO KICKOUT FLASHINGS Damage to walls at roof junctions can occur if appropriate flashings are not provided at the bottom of the roof. These are typically called kickout flashings. They direct the water away from the siding so that it does not get in behind.

VINES Vines and other vegetation are often found growing on wall surfaces. The disadvantages include increased levels of moisture held against the wall surfaces, and increased insect and vermin problems in the house. Depending on the type of plant, damage can be done, especially to wood surfaces. Extensive damage to masonry walls is rare.

Vines should be kept away from wood trim around windows, doors and eaves for example, and should not obstruct water flow through gutters and downspouts.



3.2 Brick

DESCRIPTION Brick may be made of clay or concrete. The characteristics of brick vary dramatically. Some brick surfaces are relatively soft, and erode with time. Other bricks are extremely hard. Some can be easily damaged by mechanical action; others may crack due to water penetration and freeze-thaw action. Some bricks are extremely porous; others less so. Some bricks have a hard glazed outer surface; others are uniform throughout. Most bricks are not designed to be in contact with the soil, and should be kept at least four inches above grade.

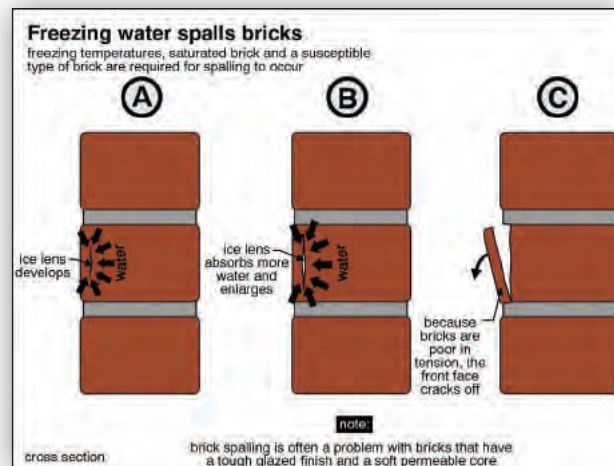
MORTAR Mortar is a mixture of a binder (Portland cement, lime, masonry cement), an aggregate (sand), and water. There are many types of mortars with different strengths, colors, and durability. Additives such as calcium chloride can enhance cold weather workability at the expense of strength and durability.

Mortar has several functions. It bonds individual masonry units together and prevents moisture penetration between units. It allows a tight joint between different masonry units despite size variations from one unit to the next. It provides a base for ties and reinforcing used to secure a masonry wall to a back-up wall, or to enhance the strength of the entire wall. Mortar can form part of the architectural appeal of a masonry wall. Mortar deterioration is more common than brick deterioration. Ideally, the strength of mortar should be similar to, but not greater than, the strength of the brick.

Common Problems with Brick

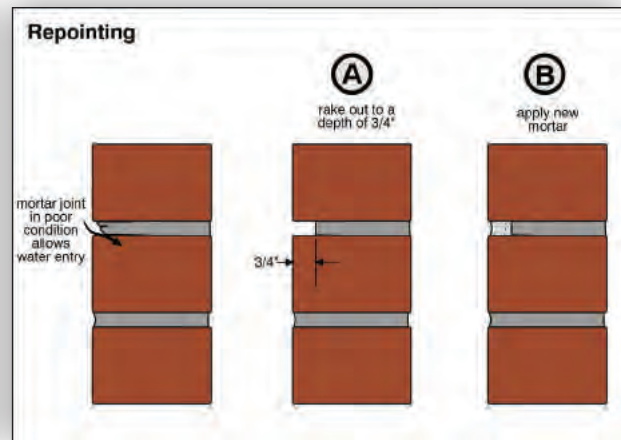
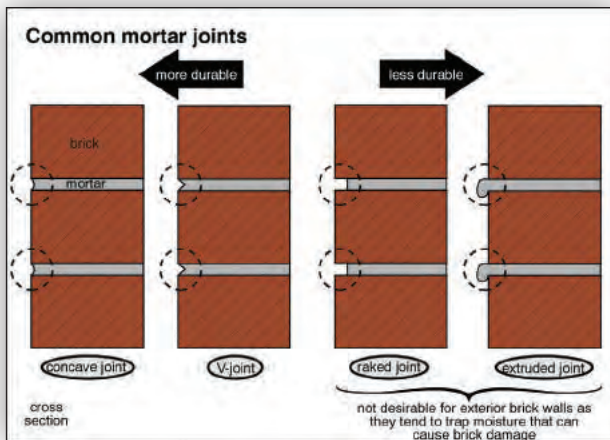
SPALLING Damage to brick surfaces, whether due to mechanical damage, freeze-thaw action or something else is known as spalling.

SANDBLASTED Brick is usually damaged by sandblasting. Brick with a soft core and a harder crust is common on older houses (the same houses that tend to require brick cleaning). Sandblasting removes the outer crust and makes the brick more prone to deterioration. Once a house has been sandblasted, it may deteriorate relatively quickly. The rate of deterioration can't be determined during a single home inspection. This often requires monitoring to determine if any remedial action is necessary. Sandblasting and high pressure liquid cleaning often damage mortar, and re-pointing is usually necessary.

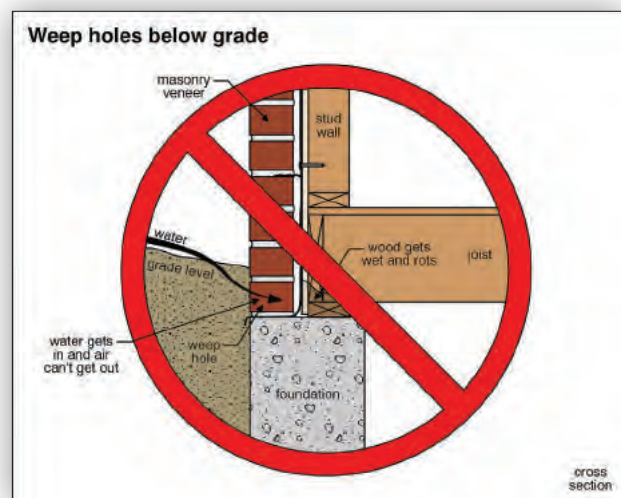


EFFLORESCENCE The white, salty deposit that appears on masonry walls is known as efflorescence. It is a result of water carrying dissolved salts to the surface of the unit and evaporating, leaving the crystalline salts on the surface. Efflorescence may be caused by low quality mortars or masonry units, or by excessive water penetration into or through the wall. In most cases it is not serious, and will disappear within a few months of new construction or chemical cleaning. Occasionally, efflorescence precedes mortar or masonry deterioration.

MORTAR PROBLEMS Mortar often deteriorates more quickly than the brick. Mortar may crack or crumble. Mortar repairs are typically called repointing.



WEEP HOLES IN BRICK WALLS BELOW GRADE Some brick walls have weep holes at the bottom to allow water to drain out. If these drain holes are not several inches above grade, water may drain into rather than out of the wall system and damage the wood framing behind the brick.



3.3 Stone

DESCRIPTION Many different stone surfaces are used in home construction. Stone can be anything from granite to limestone.

Common Problems with Stone

Stone and brick walls suffer similar problems. Stone can crack or erode depending on its quality. Mortar can deteriorate, and mortar repairs are more often needed than stone repairs. Natural stone can stain or rust, depending on the minerals in the stone. This is a cosmetic issue.

3.4 Artificial Stone

DESCRIPTION There are two common varieties of artificial stone, typically made of concrete. One is a brick substitute used on all or a portion of the exterior. It is typically three to four inches thick, and installed like any other masonry, laid in a bed of mortar. The other is a thin veneer-type covering that is less than one inch thick. The thin veneer is usually installed by providing wire mesh over the existing wall surfaces and setting the slices in a bed of mortar. The performance of this material is largely dependent upon the quality of the installation.

Common Problems with Artificial Stone

The most common problems are detachment from the building itself. Loose or damaged pieces should be re-secured to prevent moisture getting into the wall system.

3.5 Concrete Block

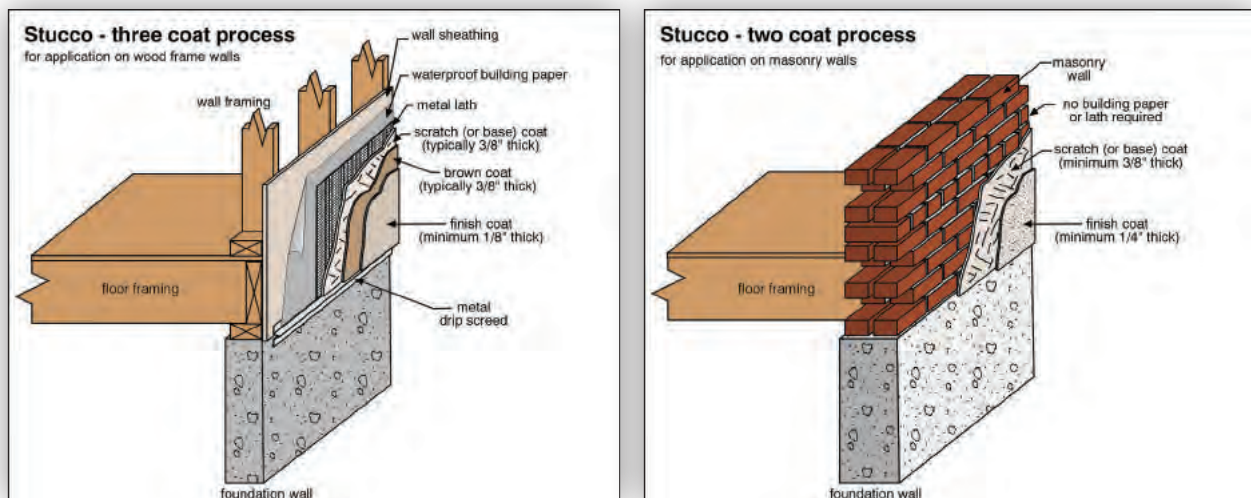
DESCRIPTION The use of concrete blocks as exterior wall coverings for residential construction is relatively rare, although concrete blocks can make a good exterior wall surface.

Common Problems with Concrete Block

Deterioration largely depends upon the configuration of the block (surface texture and shape) and the quality of the concrete. Concrete blocks are relatively porous and some can allow a significant amount of water penetration through the block. Painting the block can reduce water penetration significantly. As with all unit masonry construction, spalling and mortar deterioration are common problems.

3.6 Conventional Stucco

DESCRIPTION Stucco is the exterior equivalent of plaster, made of cement, lime, aggregate and water. Stucco can be thought of as a thin coat of concrete, with the cement and lime acting as binders, the aggregate providing the bulk and the strength, and the water initiating the chemical reaction. Much like plaster, stucco requires periodic maintenance as cracks develop. The amount of maintenance required depends largely upon the mix of the stucco, the lath used (if any), and the surface to which the stucco is applied. Stucco is typically applied in a two- or three-step process.



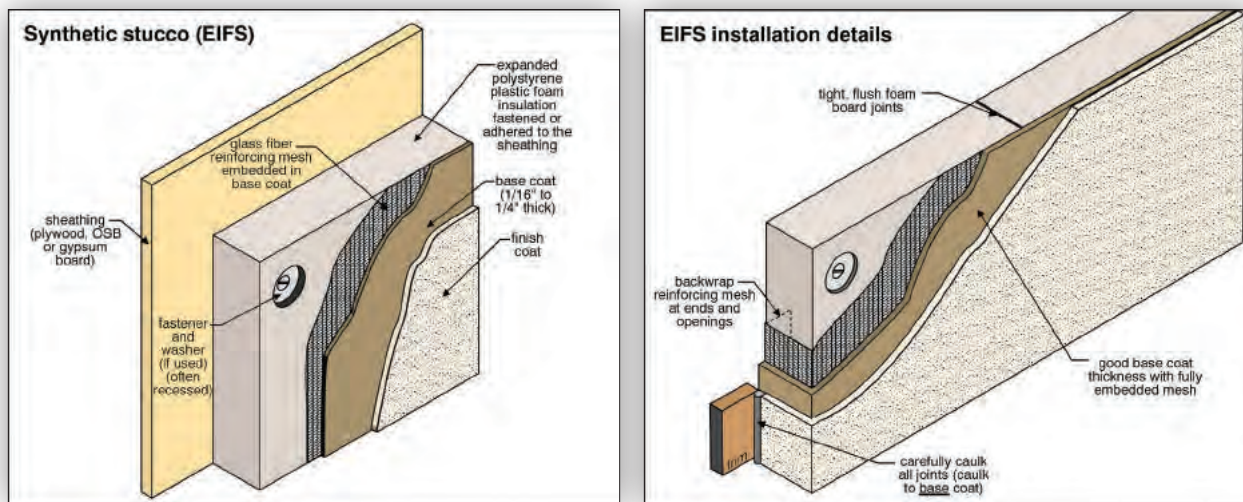
Common Problems with Stucco

CRACKS/BULGES/ LOOSE Stucco over masonry walls tends to stand up better than stucco over wood-frame construction. The rigidity of a masonry structure allows for virtually no flexing of the stucco, and consequently, less cracking and surface separation is likely to occur. Wood-frame walls expand and contract with changes in temperature and humidity, at a different rate than stucco. This leads to cracking that allows moisture deterioration, and separation of the stucco from the lath. Cracks and bulges often appear near floor levels because wood framing members shrink most in this area. Sections of stucco may come loose and fall off the building.

Cracking can allow water penetration, which may cause damage to the wall structure behind that goes unnoticed for some time. Repairs that match in color and texture are difficult to make. Stucco can be painted.

3.7 Synthetic Stucco (EIFS)

DESCRIPTION Exterior Insulated Finish Systems (EIFS) look similar to stucco but are different. Rigid wall sheathing, such as plywood, is covered with foam insulation board. A thin base coat reinforced with fiberglass mesh is then applied and covered with a thin acrylic finish coat. It is a two-step process, and the finished coating is more flexible than conventional stucco.



Common Problems with Synthetic Stucco

Problems arise when water gets trapped behind the finish and insulation. The water ultimately leads to rot of the sheathing and other structural components.

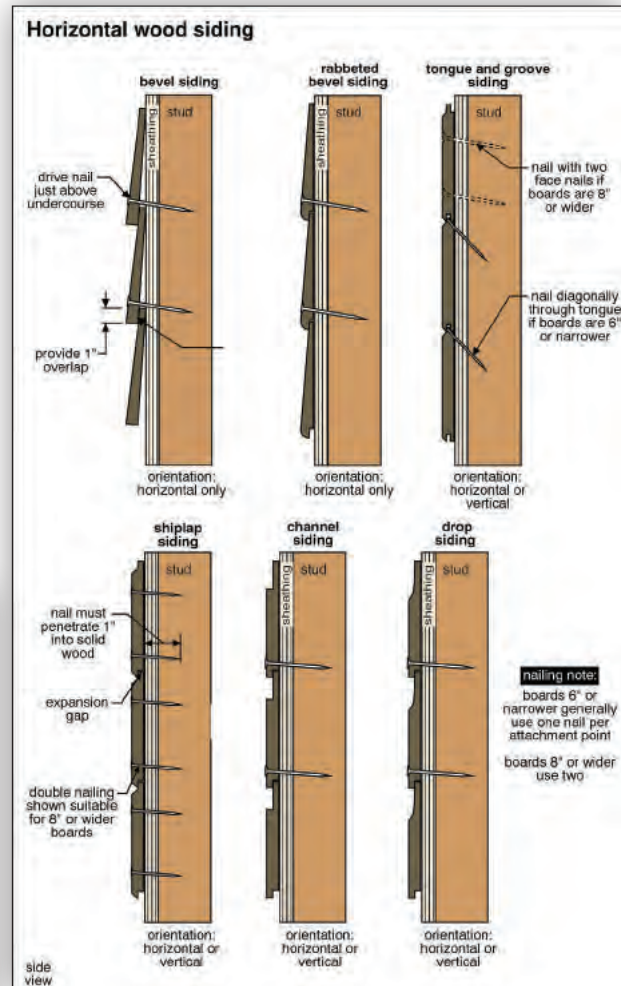
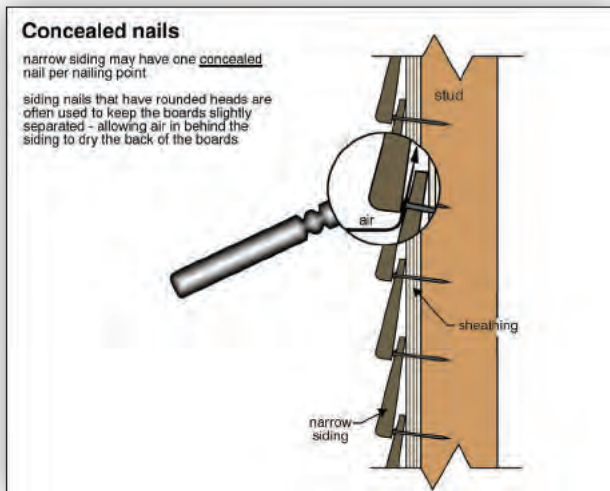
CONCEALED WALL DAMAGE Water may enter the wall system through wall penetrations around doors and windows unless all details are perfectly weather tight. As there are seldom ideal flashings at these locations, it is important that the seams be well caulked. Caulking is an ongoing maintenance issue.

There has been extensive damage to some homes, and entire wall systems have been replaced. There have been class-action lawsuits around synthetic stucco. Improved installation methods include the use of building paper between the insulation and sheathing and a drainage path for any water that does get into the wall.

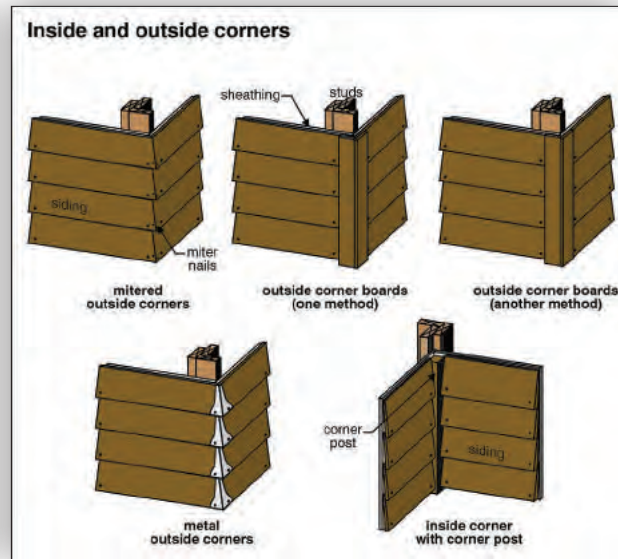
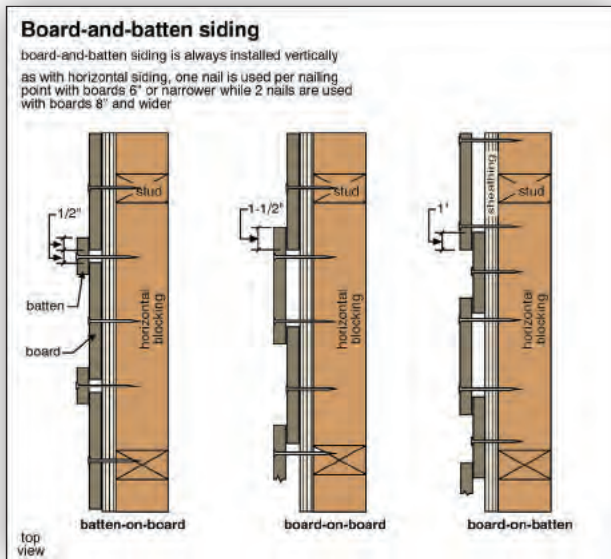
Unfortunately, neither trapped water nor rot in the wall cavity are visible during a home inspection.

3.8 Wood Siding

DESCRIPTION There are many types of wood siding, including panels, boards, shingles, and shakes. Good siding installations prevent or minimize rot and water penetration. Rot occurs wherever wood surfaces are subject to excessive moisture. Painting or staining on a regular basis protects the wood. Even rot-resistant woods such as cedar and redwood are helped by staining. Stain reduces warping, splitting, rot and discoloration.

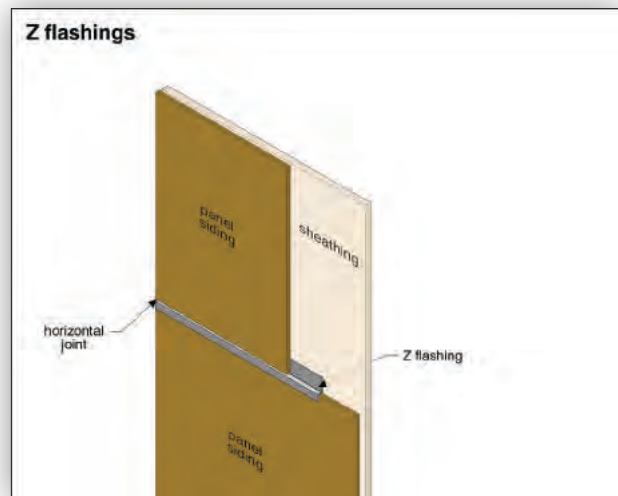


Water penetration and rot problems are most common at joints, penetrations and changes in direction or material. Joints should prevent water penetration. The horizontal joints on clap-board siding, for example, overlap one another; however, most vertical joints do not. Therefore, vertical joints should be protected with flashings or caulking. Caulking is a maintenance issue.

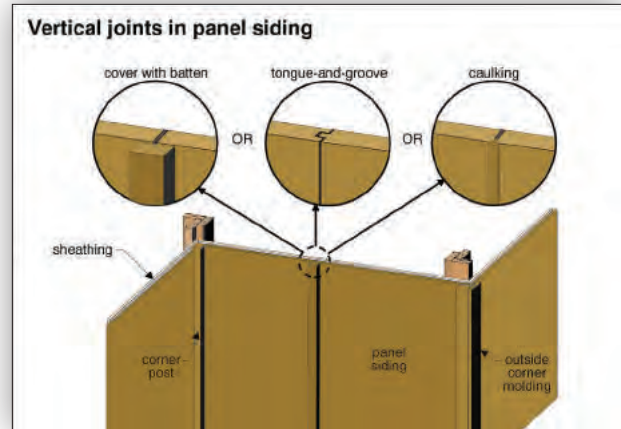


VENTILATION Wood siding holds paint better and lasts longer if the back of the siding has some air circulation. Old siding nails had round heads so that the overlying piece of siding above would not sit tightly against the lower piece. This allowed air circulation and broke the capillary joint between the two pieces of wood. This is a practice that has unfortunately disappeared. Where peeling paint is a problem, shims can be driven between the boards to promote drying. While it seems strange to say that wood walls should breathe, that is what we want.

JOINTS With panel-type wood siding, most problems occur at horizontal joints, as there is usually no overlap or batten strip. In well-executed installations, a flashing is installed at horizontal joints to prevent water penetration.

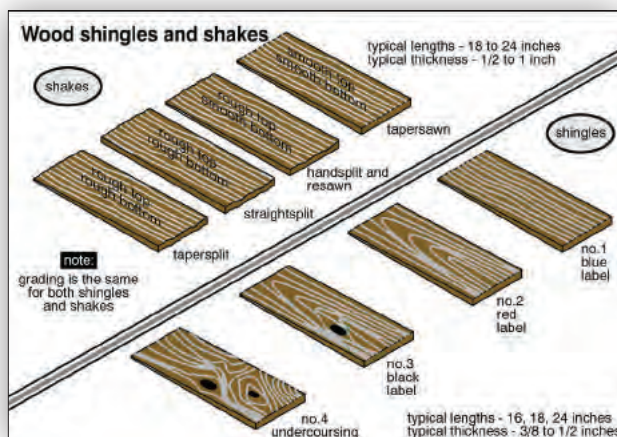


Many wood siding systems require pieces of wood trim to be installed over the joints. The top surfaces of these pieces of trim are prone to rot. The rotted wood eventually allows water penetration at the joints. Horizontal surfaces should be kept well stained or painted, should be slightly sloped so water will drain off, and should be caulked where they meet vertical surfaces.



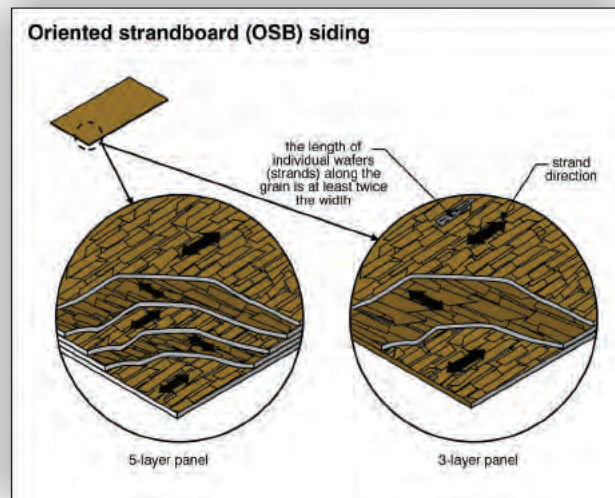
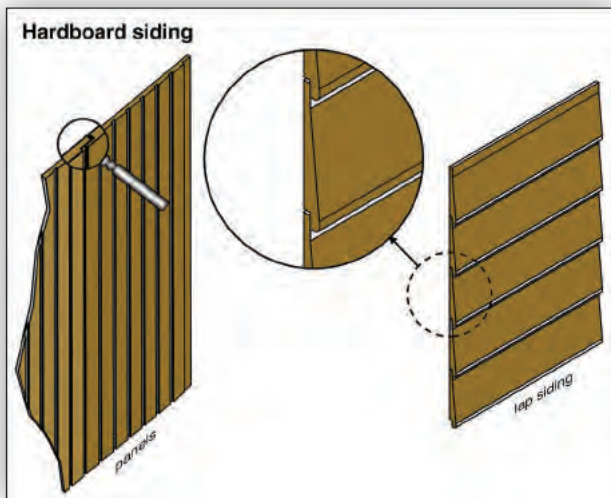
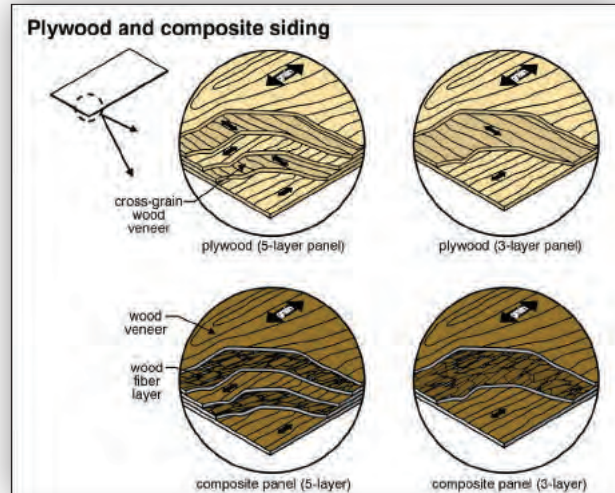
Common Problems with Wood Siding

- ROT** Prolonged exposure of wood siding to moisture will eventually result in deterioration and rot. Continual maintenance on exterior wood surfaces is very important.
- SPLITTING** Wood siding may split if improperly nailed. Too many nails may prevent natural expansion and contraction. Nailing too close to the edges will result in splitting.
- WOOD/SOIL CONTACT** Wood/soil contact should be avoided, as it promotes rot and provides an ideal environment for wood-boring insects. Wood siding should be at least six inches above the soil.
- PAINT/ STAIN** With the exception of cedar, redwood, and pressure treated lumber, all wood used outside should be protected with paint or stain. Painting or staining is usually done every three to five years. Chronic paint blistering and peeling may indicate moisture problems in the wall behind.
- CRACKING** With age, wood shingles will lose their resins, and begin to warp and crack. There are several different qualities of wood shingles. Better shingles last longer. When more than 15% of the shingles require repair or replacement, total replacement may be advisable.



3.9 Hardboard, OSB and Plywood Siding

DESCRIPTION There are a variety of hardboard, oriented strandboard (OSB) and plywood sidings on the market. Some simulate wood siding, while others simulate stucco. Depending upon the type of material, the joints may be covered with trim, as discussed earlier.



Common Problems with Hardboard, OSB and Plywood

WATER PENETRATION Water penetration behind the trim deteriorates the trim itself, and allows water to collect at the edges. This can lead to swelling, delamination and failure of the siding. Proper sealing and caulking of the horizontal surfaces of trim are required. Horizontal edges of panels not covered with trim should be installed with flashing, unless the joint in the material is specifically designed to prevent water penetration.

ROT Rot may result from water penetration behind the trim or on the surface of the siding.

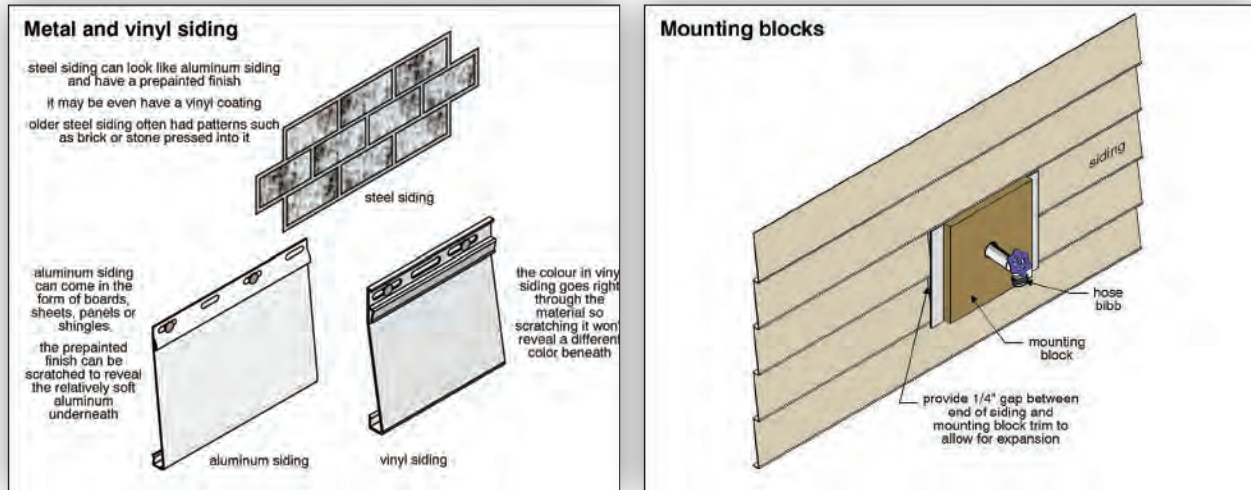
BUCKLING Buckling of hardboard siding is a problem caused by expansion of the hardboard when wet. This material expands more than wood when wet and, if it is tightly nailed at each stud, it may buckle in or out. Securing the boards with clips or using smaller pieces help prevent buckling.

PAINT Prefinished systems do not require regular painting. Unfinished wood siding requires painting or staining to protect it from the elements.

3.10 Metal Siding

DESCRIPTION A variety of metal sidings are available. They can be boards or panels, with a variety of surface treatments, often intended to mimic wood. Some are installed vertically, while others are installed horizontally. The most common material is aluminum although steel is also used.

Metal sidings usually have a baked-on enamel finish and, generally speaking, the painted surfaces stand up well. However, some lower quality or older sidings tend to fade and chalk.

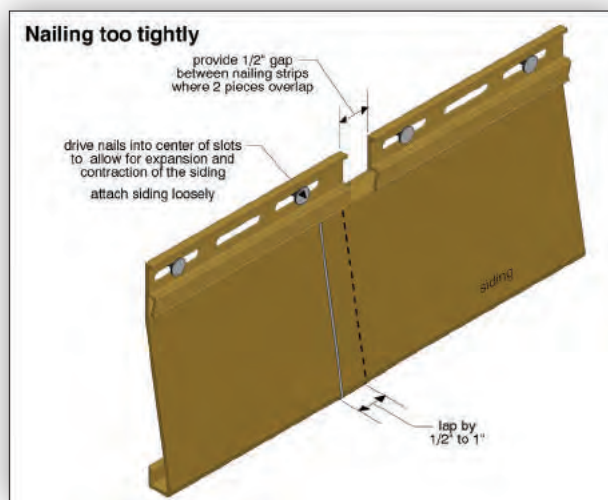


VENTILATION AND INSULATION Metal sidings should be ventilated to allow air and moisture pressures to equalize on either side of the metal. Some early sidings did not breathe well and led to moisture problems in walls. Insulated metal siding is available, although the amount of insulation is typically small.

Common Problems with Metal Siding

INSTALLATION ISSUES Most problems associated with metal sidings are installation defects, rather than material defects. A lack of adequate fastening, and a lack of moldings and trim pieces where the siding butts other materials or changes direction are the most common problems.

DENTING/BUCKLING Metal sidings are prone to denting (particularly aluminum). Damaged sections can be replaced on an individual basis. Metal sidings expand and contract with changes in temperature. It is not uncommon to hear expansion noises when sunlight warms a wall of the house. Slots in the siding accommodate the nails. As the siding expands and contracts relative to the substrate, the siding can slide. If the nails are secured too tightly, the siding may buckle.



3.11 Vinyl Siding

DESCRIPTION Vinyl siding is extruded polyvinylchloride (PVC). The colors go through the material, so scratching the surface will not reveal a different color below. Also, the color cannot peel or chip off the surface. The material comes in boards or panels, often intended to look like wood. Some of the newer products can be painted successfully, although this turns a maintenance-free siding into a maintenance-dependent siding.

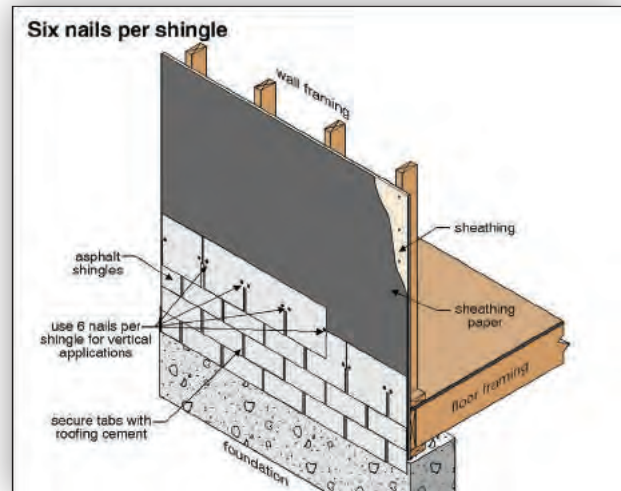
Common Problems with Vinyl Siding

Vinyl sidings are similar to metal sidings in that the majority of the problems are associated with installation, rather than the material itself. A lack of proper securing, and improper detail work at edges and corners are the most common deficiencies. Some vinyl sidings discolor with age. Most come in a limited color selection. Vinyl siding can become brittle during cold weather, and can be punctured or cracked. Individual pieces, however, can be replaced.

TEARING/ BURNED/BUCKLING Vinyl siding can tear as a result of mechanical impact. Barbecues too close to vinyl siding may melt or burn the siding. Buckling vinyl siding may be the result of shrinking wood framing behind, or securing the siding too tightly to the substrate. The siding expands and contracts with changes in temperature, and must be able to expand and contract on the wall.

3.12 Asphalt Shingle Siding

DESCRIPTION Asphalt roofing shingles are sometimes used as siding. See the Roofing chapter for a description of asphalt shingles. Where roofing shingles are typically secured with four nails or staples per shingle, six fasteners per wall shingle is typical.

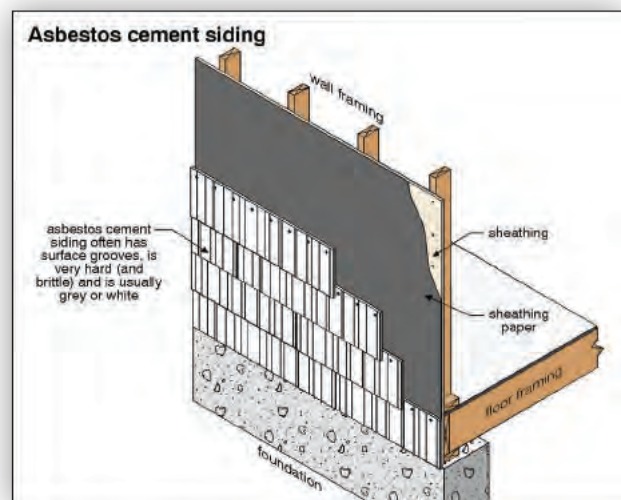


Common Problems with Asphalt Shingles

LIFTING SHINGLES The biggest problem associated with using shingles on walls is that the shingles do not tend to lie flat. Modern shingles are of the self-sealing variety. A tar strip on the upper portion of one shingle is supposed to adhere to the lower portion of the shingle above, and should prevent the shingle from lifting or curling. Unfortunately, this process relies on gravity (the weight of the shingles) and sunlight (to heat up the shingles and soften the adhesive). This process works well on roofing systems; however, it does not work well when shingles are installed vertically. Therefore, shingles tend to lift, curl, and be prone to wind damage. (Shingles that have just begun to lift can be sealed in place.) They are easily patched, but matching colors is sometimes difficult.

3.13 Fiber Cement Siding

DESCRIPTION Fiber cement siding comes in shingle, plank and panel form. This is a strong, rigid siding that typically performs well. Older versions used asbestos as the fiber and were called asbestos cement siding.



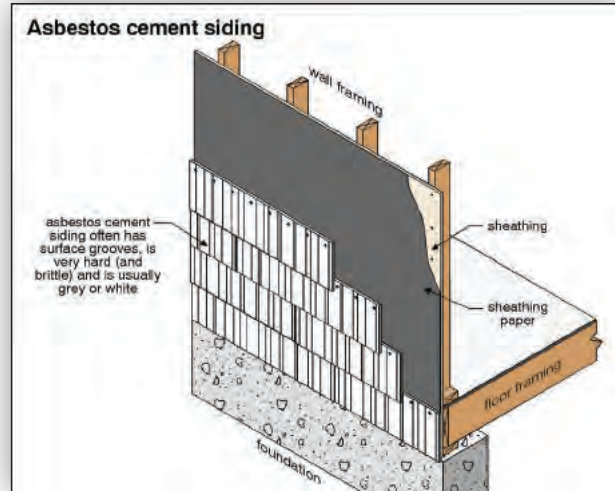
Common Problems with Fiber Cement Siding

CRACKED/ BROKEN Older fiber cement shingles have a long life expectancy; however, they are brittle and subject to mechanical damage. Replacement pieces that match may be difficult to find. The life expectancy of newer fiber cement products is expected to be similar.

IMPROPER NAILING Modern fiber cement siding is often applied with pneumatic nailers. Nails are sometimes driven too far into the siding and the siding may not be well secured to the building.

3.14 Clay Tiles and Slate Shingles

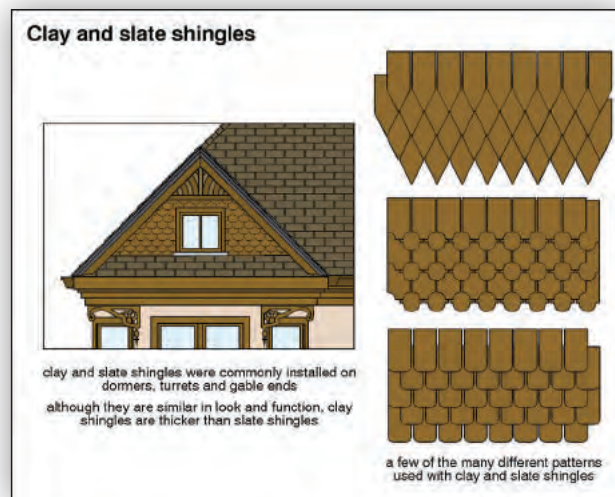
DESCRIPTION Clay tiles and slate shingles were often used on Victorian-era and circa-1900 houses for siding on small areas, such as dormers and gables.



Common Problems with Clay and Slate

CRACKED/ BROKEN These shingles will easily last 100 years; however, they are brittle and subject to mechanical damage.

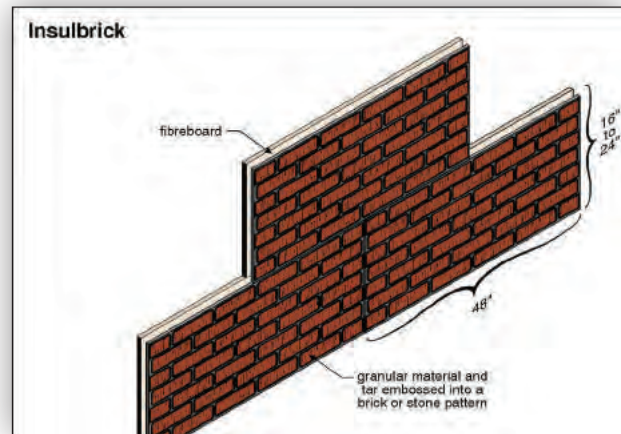
FAILED FASTENERS Clay tile and slate can often last a long time, but the nails that hold them in place rust, allowing the tiles/slates to slip out of position. Patching can be undertaken; however, it is often difficult to match the color and texture. The general rule is that if more than ten to fifteen percent of the tiles/slates are damaged, an alternative siding material should be considered.



3.15 Insulbrick Siding

DESCRIPTION Despite its name, Insulbrick has very little insulating value. Various types of Insulbrick were commonly used from the 1930s to the 1950s. Insulbrick can be considered the forerunner to aluminum siding.

Insulbrick consists of a fiberboard sheathing coated with tar and sprinkled with granular material. The surface is embossed to look like brick, or sometimes stone.



Common Problems with Insulbrick

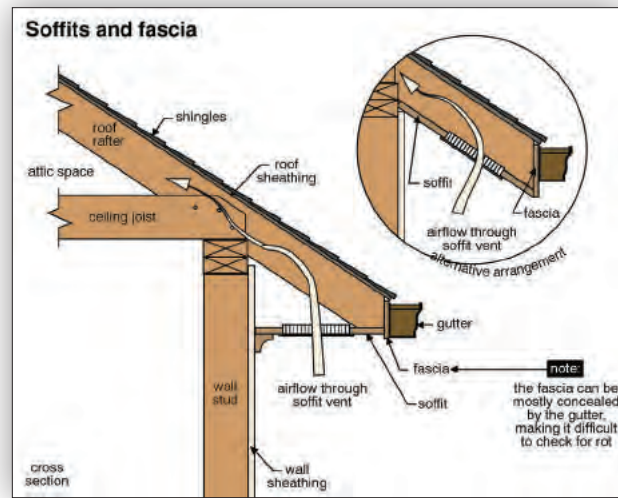
WORN/DAMAGED Insulbrick siding will eventually wear out; however, the majority of the problems are physical damage, and leaking joints. Caulking and re-securing are necessary from time to time. Obtaining replacement pieces is difficult, as the material is no longer made.

INSURANCE ISSUES Insulbrick is frowned on by some insurance companies and lending institutions. This is thought to be due to its combustibility, and the fact that to some people, it suggests low-quality construction. Its bad reputation is unwarranted; however, the material can easily be covered with an alternative siding.

4.0 Doors, Windows and Trim

DESCRIPTION The purpose of doors and windows is apparent. We will focus on door and window trim here. Doors and windows are discussed in the Interior chapter. The trim on the exterior of a house helps protect the structural components from weather, prevent the entry of vermin, cover joints at changes in material or direction, and improve the appearance of the house. Trim is most often wood, vinyl or aluminum, although other materials, including stone, are also used.

Trim is usually found around doors and windows, and at the eaves. The two most common components of the eaves are soffits and fascia. The soffit is installed horizontally, and covers the underside of the eaves. The fascia is a vertical component at the edge of the eaves. Gutters are often fastened to the fascia.



Common Problems with Trim

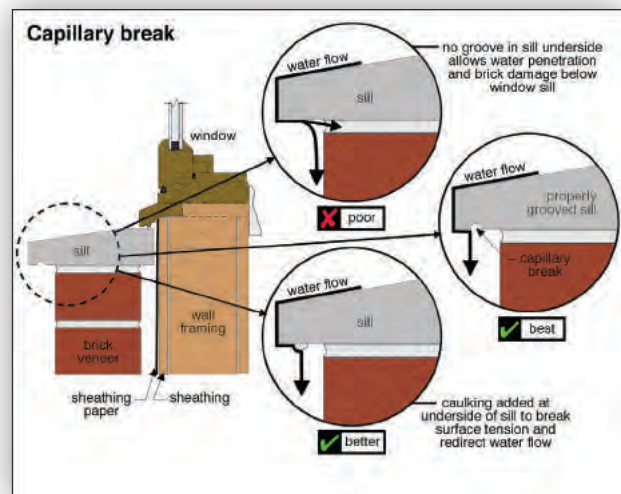
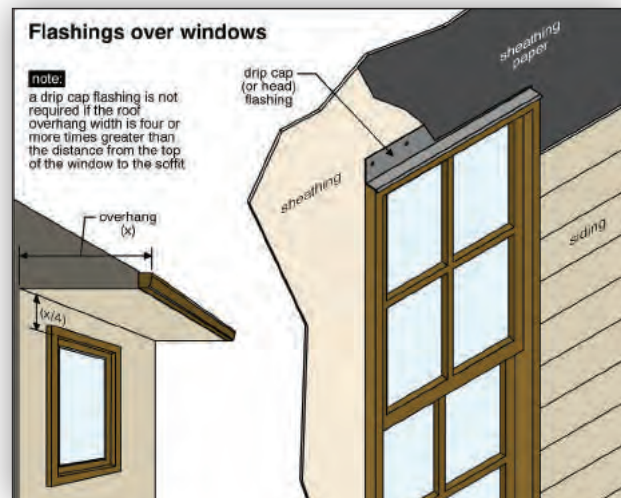
- ALUMINUM – LOOSE/MISSING/DAMAGED** Well-installed aluminum trim is relatively maintenance free. Poorly secured, missing or damaged trim can be an issue.
- WOOD – PAINT/ROT/LOOSE/MISSING/DAMAGED** Wood trim components require regular painting, and maintenance, and are subject to all of the issues that affect outdoor wood. Trim components are often rotted, missing, loose or damaged by vermin. Squirrels, birds and raccoons damage soffits and fascia to gain access to the attic space.
- PAINTING AND CAULKING** Exterior trim components including those around windows and doors, as well as soffits and fascia, are prone to weathering and to opening up at seams and joints. Improvements to paint and caulking should be considered regular maintenance items with some work typically required annually.

4.1 Door and Window Flashings

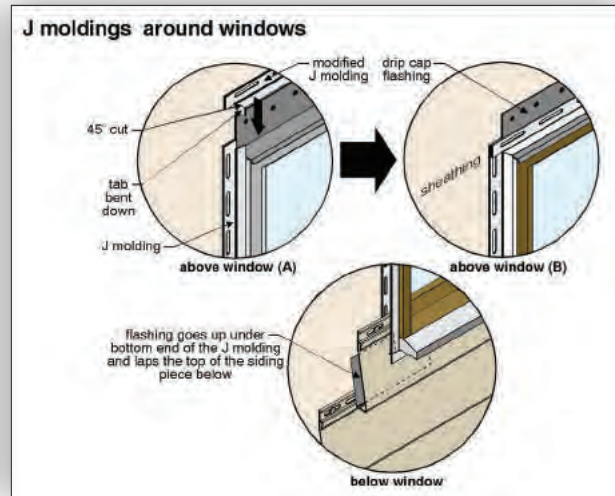
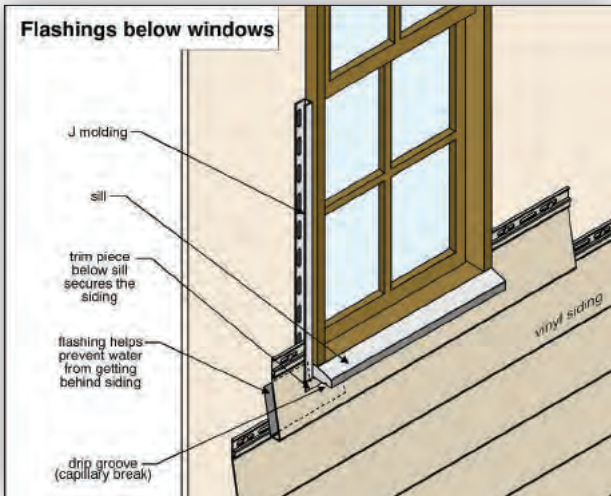
DESCRIPTION Some exterior doors and windows project out horizontally from the wall surface. Water can collect on the top, rotting the trim and leaking behind it. Metal flashings are often provided in these areas. The exposed edge of the metal flashing is bent out to prevent water from dripping on the surfaces below. The flashing tucks up behind the siding above or is let into a mortar joint in brick construction. (Most windows in masonry houses do not require flashings because the window frames are recessed.)

Flashing is not required where the opening is protected by a roof overhang. As a general rule, if the distance from the window or door to the overhang is less than one-quarter of the overhang width, no flashing is needed.

SILL SLOPE Door and window sills should be sloped so that water drains away from, rather than toward the door or window. The sill should project far enough out so that water can drip off without wetting the area below. Good design incorporates a capillary break (groove or projection on the underside of the sill), which prevents the water from being drawn back into the siding by capillary action.



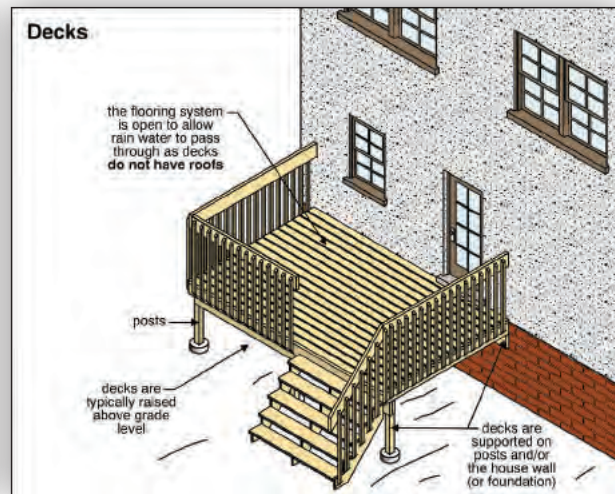
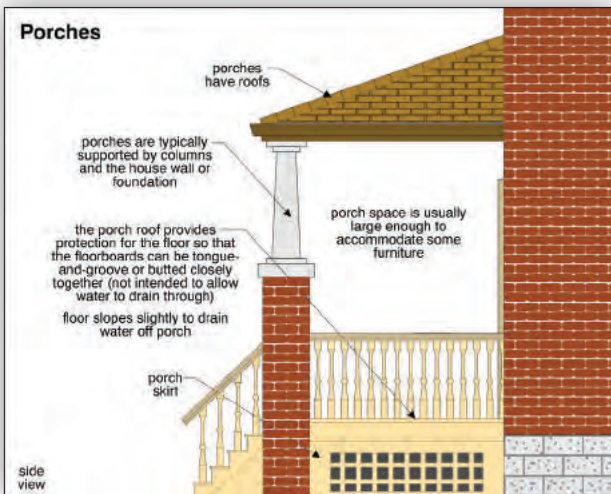
PAINT/ROT/ LOOSE/MISSING/ DAMAGED/ WATER ENTRY Wood components rot if water does not drain freely away or if maintenance is poor. Flashing, window sill and door threshold details are common problem areas. If doors and windows are not fit and maintained properly, water can get into the wall system and damage the structure.



LOW THRESHOLD Door thresholds should be at least six inches above exterior grade, steps, decks or landings in climates where snow may accumulate.

5.0 Exterior Structures

DESCRIPTION These include porches, decks, patios, balconies and entrances. They are attached to the home but not an integral part of the house itself. They may include steps, railings, columns, beams, joists and floors.



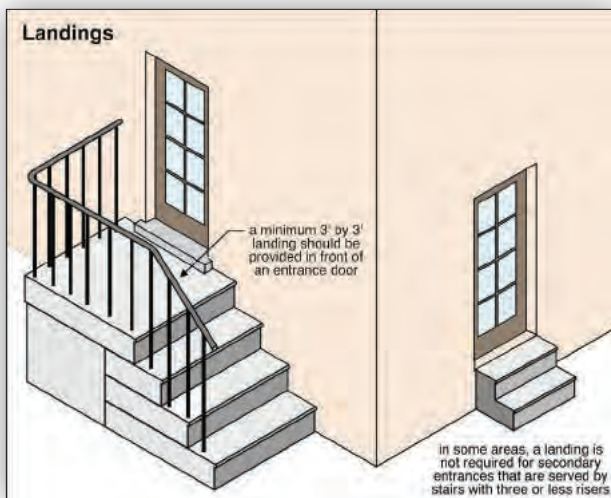
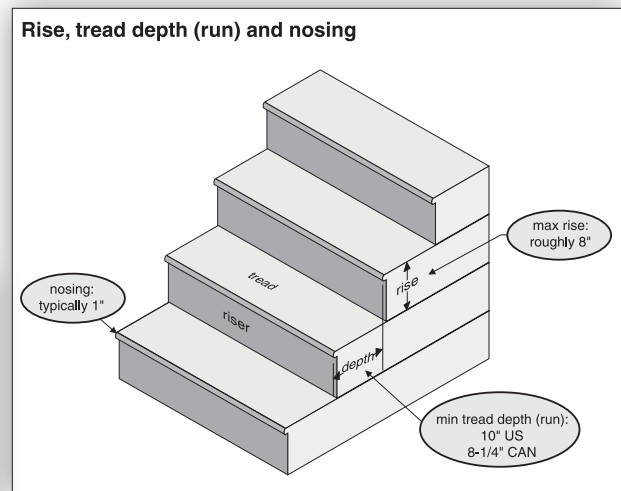
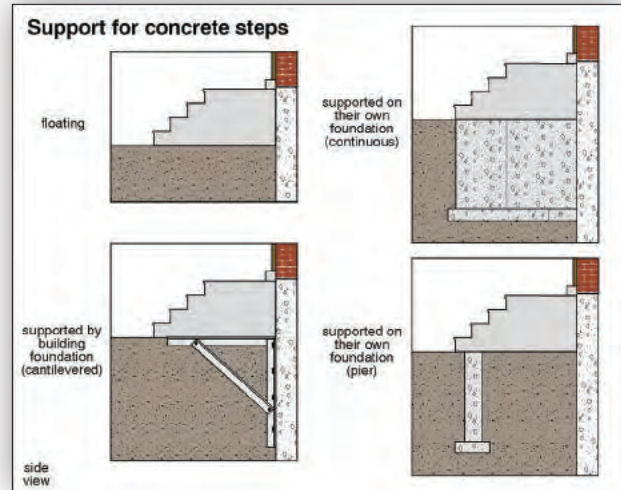
5.1 Steps

DESCRIPTION Steps are commonly made of wood, concrete or masonry. Wood steps should be sturdy enough not to flex with typical traffic. One to 1-1/2 inch thick treads are normally fine, depending on the spacing of the stringers that support the treads.

Concrete steps may have a footing to avoid settling and frost heaving. They may also be attached to the building, or may be floating prefabricated concrete units.

RISE AND RUN Regardless of the material used, all steps should be easy to negotiate. Steps should have at least 10-inch deep treads and be no more than roughly 8 inches high. Steps should be sloped slightly to drain water.

LANDINGS When stepping through a door, it is easier to have a landing to step on than stairs. Landings are typically at least three feet by three feet. Landings should be six inches below door thresholds so water does not leak in through the door.



Common Problems with Steps

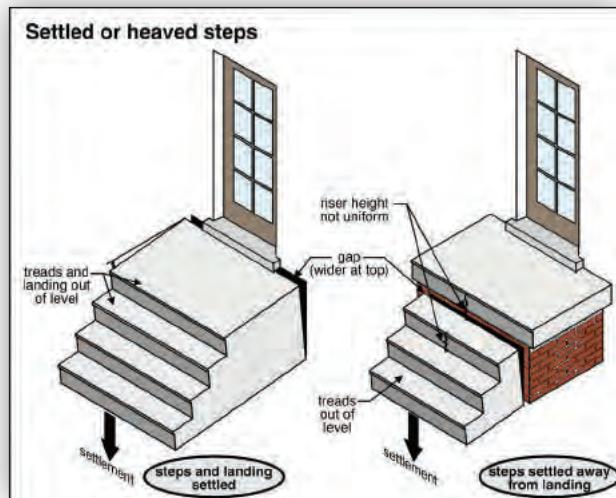
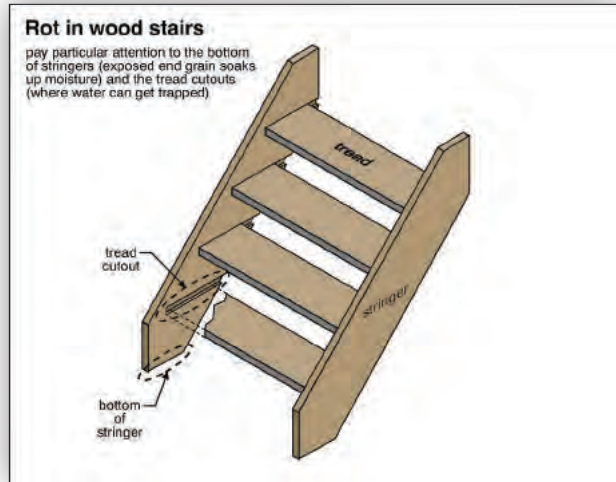
ROT/INSECT DAMAGE The most common problems associated with wood steps are rot and attack by insects. Direct wood/soil contact should be avoided to minimize damage by rot or insects. Carpeting on wood steps retains moisture and promotes rot. Plywood is not a good material for steps, since the layers of glue tend to trap moisture, creating rot and delamination of the plywood.

SPRINGY Poorly designed steps move considerably when they are walked on. Strengthening is sometimes required.

SPALLED OR DAMAGE Concrete steps tend to crack or spall. Avoid using salt on these surfaces. Some steps are constructed of brick. Certain types of brick should not be in contact with the soil as they absorb a considerable amount of moisture and suffer deterioration from freeze/thaw action.

SETTLED OR HEAVED This is a common problem with concrete steps.

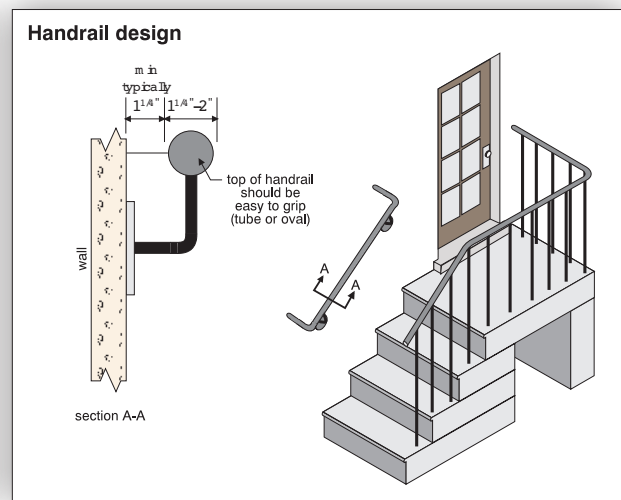
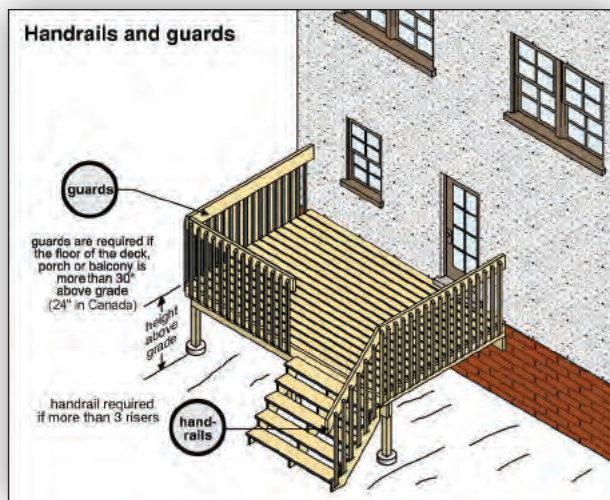
RISE/RUN/ UNIFORMITY/ LANDINGS Steps should be uniform so that they can be traveled easily. The rise should not be more than 8 inches, and the run should be at least 10 inches. Landings should be provided where needed at the top of steps, so people do not get knocked over by opening doors.



5.2 Railings

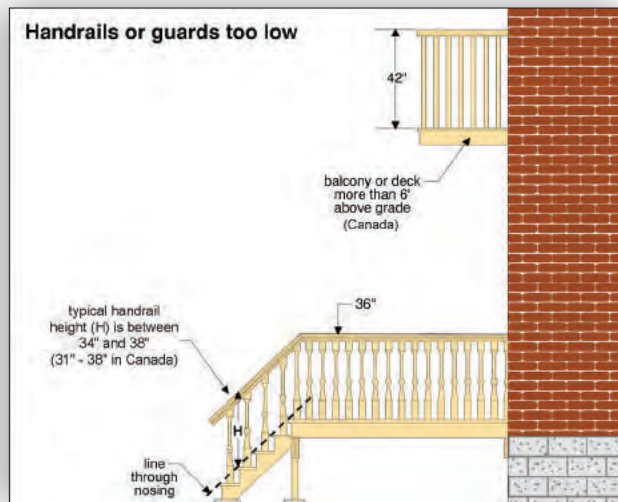
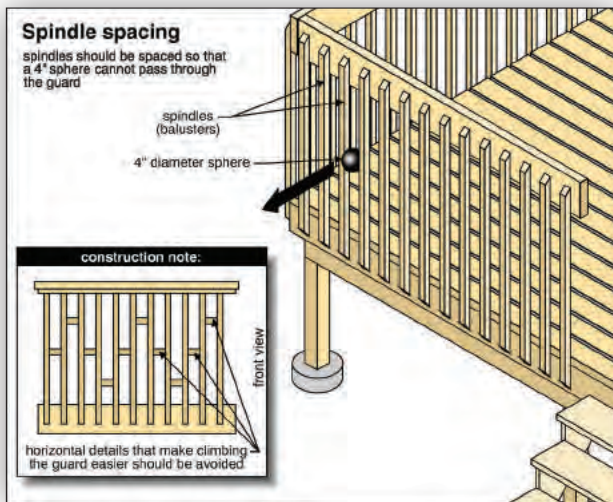
DESCRIPTION Railings should be provided wherever there is a danger of falling, or when the deck is more than 24 to 30 inches off the ground. Railings should be sturdy enough to resist a person's weight and openings in the railing should be small (four inches or less) so children cannot crawl through. Railings should be high enough to provide adequate protection; 36 inches is common. On wide stairways, railings should be provided on both sides. Railings should not prevent drainage of water off porches, decks and balconies. They should not have horizontal members that children may climb.

Railings should be easy to grab to help prevent a fall.



Common Problems with Railings

- MISSING/ LOOSE/ ROT/ RUST** The most common problem is missing railings. Railings are also often loose, rotted or rusted. Many railings are not strong enough or not well enough secured to prevent someone falling through the railing. This is difficult to determine without damaging the railing.
- POOR DESIGN** Railings may be too low, have openings that people may fall through, or have horizontal members that make it easy for children to climb the railings. These are safety issues.



5.3 Columns

DESCRIPTION Porch columns support a roof and/or a floor system. They can be wood, metal, poured concrete, masonry or a combination of these. They must be strong enough to handle the imposed load and must have proper foundations and footings to prevent settling or frost heaving. Wood soil contact should be avoided.

Common Problems with Columns

- DETERIORATION/ DAMAGE** The most common problems with porch columns are the result of simple deterioration. Brick columns absorb moisture, damaging the brick and mortar by frost action. Wood columns rot and are subject to insect attack. Direct wood/soil contact should be avoided.

Columns can be mechanically damaged by impact, although this is not common.
- OUT OF PLUMB** Columns may be installed out of plumb or they may shift. Where they are unstable, replacement is necessary.

5.4 Beams and Joists

DESCRIPTION Beams and joists should be strong enough to transfer the roof or floor loads (people, furniture, and snow) to a wall or column. They are typically wood, but can be steel.

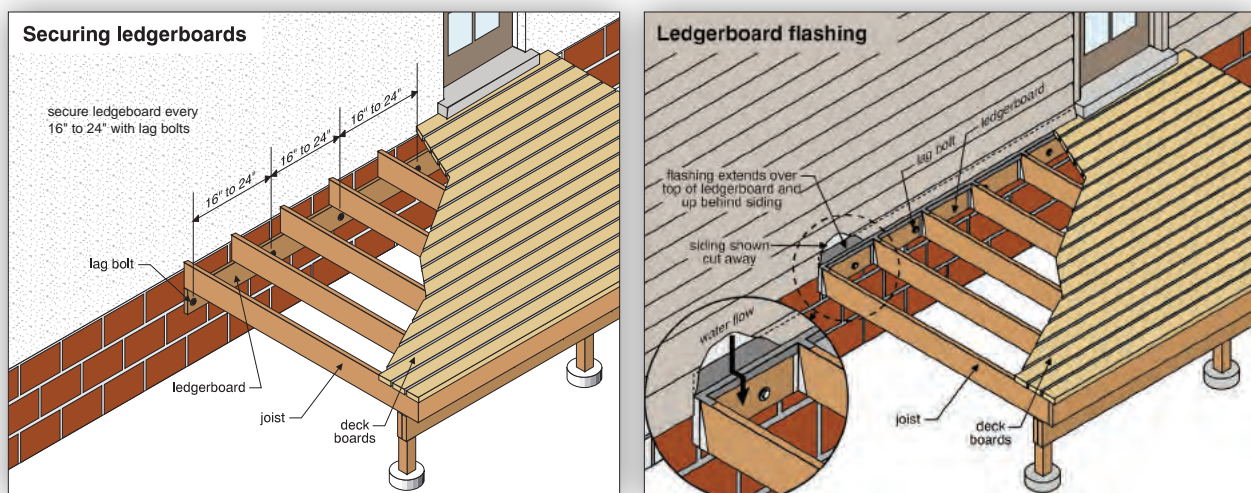
Beams and joists should be adequately supported, well connected and arranged to minimize rot and wood/soil contact.

Common Problems with Beams and Joists

SAGGING The most common problem with porch beams is that they are undersized (overspanned), resulting in sagging. Overspanned joists result in a springy floor system. Additional supports can often be added to stiffen structural members, or they can be enlarged or replaced.

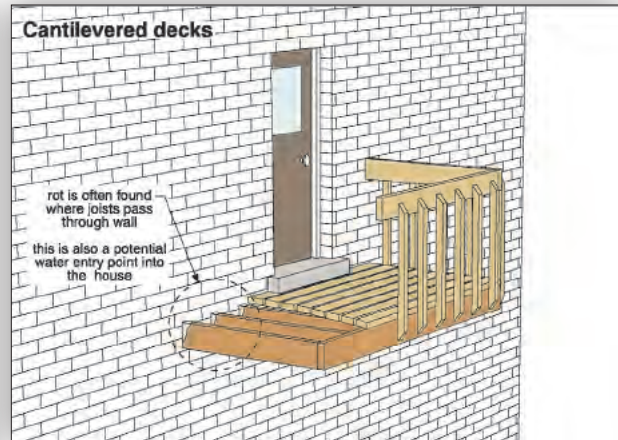
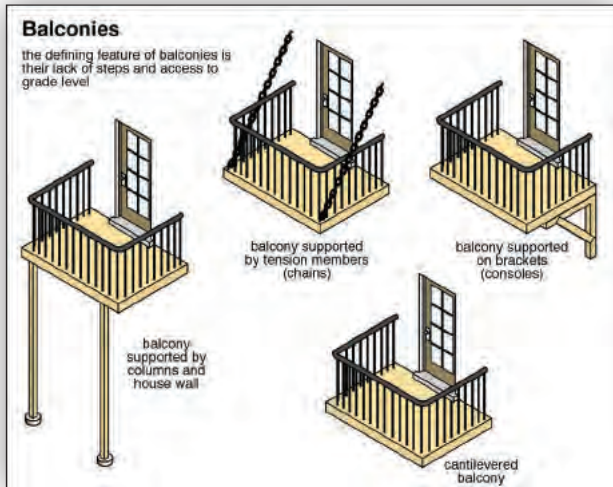
END BEARING Porch beams are often poorly supported when columns have been removed or have shifted. Joist and beam ends should rest on 1-1/2 inches of wood support, or on three inches of concrete or masonry support, respectively.

DECKS HAVE TO BE WELL SECURED TO BUILDINGS Joists should be well secured to the building. A board that is lag-bolted to the structure may support the joists from below. Joist hangers may also be used. Many serious injuries have resulted from improper deck support. This detail should also be protected with flashing so the water does not get into the wall system. After construction it is difficult to determine whether support is adequate. Alternatively, the deck may be completely detached from the building.



ROT Trapped moisture in a porch or deck structure rots wood beams or joists, weakening the structure and providing an ideal environment for insects. Many porch beams are concealed in a roof structure and are not visible, but years of roof leaks cause beams and joists to rot and the roof system to sag.

CANTILEVERED DECKS AND BALCONIES – ROT These have special problems, usually related to the support joists that extend through the building wall. These structures may be weak due to poor initial construction, or the joists may rot where they go through the building wall. The building wall may also rot as a result of water penetration around cantilevered joists.



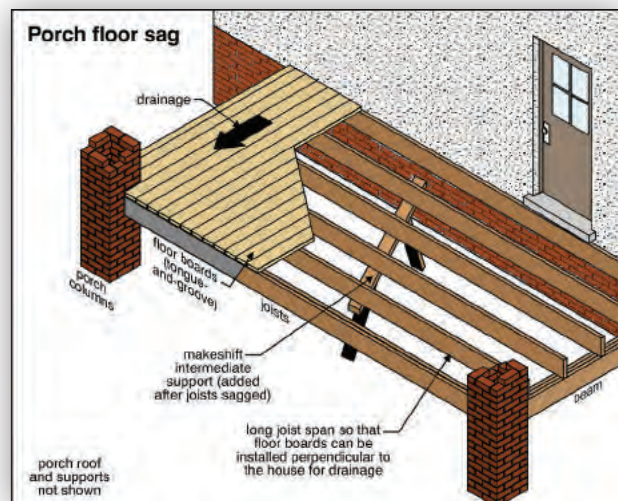
5.5 Floors

DESCRIPTION Porch floors slope to drain water off, unless they have spaced flooring like decks. Carpeting is not used as it holds moisture, promoting rot. Plywood or waferboard should not be used for the same reasons.

Some porch floors are covered with metal, vinyl or canvas. In many cases, these materials have deteriorated and replacement is required. Some porches are covered with roll roofing or roofing felts. These materials are not suitable for regular foot traffic.

Common Problems with Floors

Rot and sagging are the most common problems.

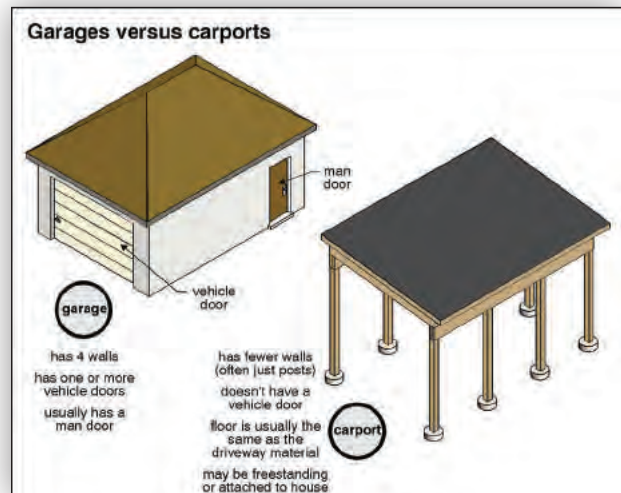


6.0 Garages and Carports

DESCRIPTION Garages may or may not be attached to the house. Garages have many of the same features as houses and can be thought of as secondary buildings. Most floors are concrete slab-on-grade, walls are often the same type as the house walls, and the roof may be integrated with the house roof. Garages may be tucked into the home with living space above.

Vehicle doors may be wood, hardboard, aluminum or steel. There are a variety of ways in which garage doors can open; however, overhead sectional doors are common. There may be a 'man-door' in the garage.

CARPORTS Carports are simple roof structures supported on columns. They may be attached to the home on one, two or three sides.



Common Problems with Garages and Carports

LOW QUALITY DETACHED GARAGES Garages are often lower quality than the house, and in poorer condition. They are just for cars, after all. The necessity for repairs is subjective, and different homeowners have different standards for what is acceptable.

Problems with the garage framing, roofing and siding for example, are addressed the same way as house problems. Detached wood-frame garages often have no foundations and footings. Wood frame walls may sit directly on or very close to the soil. The garage itself may heave with frost action in cold climates, but more importantly, the bottom of wood walls rot and the garage begins to lean. Misalignment of the overhead door comes first, then structural failure.

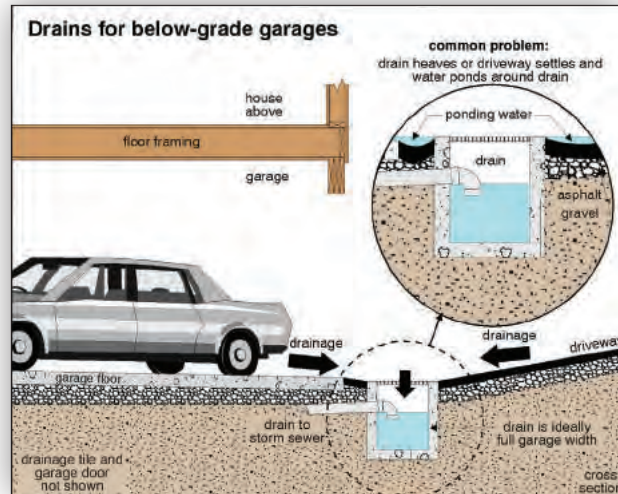
Corrective action includes straightening the structure and replacing at least the bottoms of wood walls. Depending on the overall condition of the garage, it may be more cost effective to rebuild it.

FIRE PROOFING The doors, walls and ceilings of attached garages that connect to the home may be required to have a fire separation from the house.

COMBUSTIBLE INSULATION Insulation is often added in garages. Combustible plastic insulation is very common. It should be removed or covered with a non-combustible surface such as drywall since it is a fire hazard.

CRACKED FLOOR Minor cracks in garage floor slabs are common. Serious cracks and/or settling may indicate structural problems, but more commonly indicate an improper base below the concrete. Concrete floors should be at least three and a half inches thick.

POOR DRAINAGE Garage floors should be sloped to drain water out of the garage. If this is not possible, a drain should be provided. Often, drains in garages are neglected and are plugged, broken, or undersized. Settlement of garage floor slabs may affect the drainage so that water will not flow out. Drains in garages are not permitted in many areas for fear people will drain oil and other fluids into the sewer system.



VEHICLE DOOR PROBLEMS The most common problems with garage doors are hardware issues. Hinges, tracks, springs and counterweight systems often require adjustment. Garages that have settled, resulting in a door frame that is out of square, contribute to the problem.

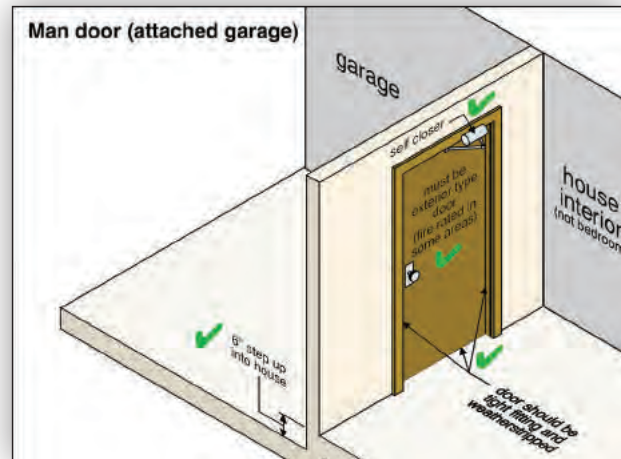
The bottom edges of wood garage doors tend to rot and the bottom edges of steel doors rust. The decision to repair or replace is somewhat subjective. Metal doors may be dented. In most cases this is a cosmetic issue. Damage from vehicle impact may render the door inoperative.

DOOR MISALIGNMENT Garage door openers sometimes fail due to misalignment of the garage door or track. Some jurisdictions require that the opener be plugged into an electrical outlet not more than six feet from the opener.

AUTOMATIC REVERSE All garage door opening devices should automatically reverse the door if it strikes something while closing or if something blocks a photo-electric eye near the floor. This feature reduces the risk of injury. Garage door openers should have a sensitivity adjustment. It is often set incorrectly.

SPRING RESTRAINT Where overhead door springs do not have a rod going through them, they are often strapped to prevent the spring from becoming a projectile if it fails.

MAN-DOOR ISSUES Any door between the house and the garage should be self-closing, should be tight-fitting and be fire-rated. It may also be a solid exterior-type door at least 1-3/8 inches thick.



7.0 Walkways, Driveways and Landscaping

These components are addressed in a home inspection to the extent of their impact on the building.

WALKWAYS, DRIVEWAYS & PATIOS Walkways and driveways may be gravel, asphalt, concrete, stone, or pavers (individual paving stones or bricks). Regardless of the material, they should be slightly sloped to drain water away from the house. They should be relatively smooth, easy to walk on and free of trip hazards.

Common Problems with Walkways, Driveways and Landscaping

POOR SLOPE Improper slopes often cause wet basement problems, and in some cases, erosion and/or frost damage to building foundations. Where walks or driveways pull away from the building, water can accumulate along the foundation wall, again resulting in wet basement problems. In some cases a drain is required to carry surface water away. The drain should be arranged to prevent clogging with debris or frost damage to the drain assembly. The pipes leading from these drains cannot be examined during a home inspection.

TRIP HAZARD Heaved or uneven sections of walkways or patios may create trip hazards.

TREES/SHRUBS/PLANTERS – TOO CLOSE TO BUILDING Shrubs, trees, and planters may add to the appearance and value of a property, but can adversely affect the building. Shrubs and trees too close to a building can hold water against walls, prevent wood components from drying out and provide pests with good access into the house.

Tree branches can cause mechanical damage to roof and wall surfaces, leaves can clog gutters and downspouts, and roots can clog drainage pipes and in severe cases, dislodge foundations. Raised flower gardens or planters can cause wet basement problems, especially as a result of heavy watering of flowers during the summer months.

RAISED GRADE LEVEL ISSUES Where the original grade level has been raised by adding topsoil, there are three concerns. The building wall may be subject to damage if wood components are in contact with the soil. Water may leak into the building if the soil is above the top of the foundation wall. The increased load exerted on the foundation wall can push the foundation wall inward, particularly in areas where frozen soil conditions may exist.

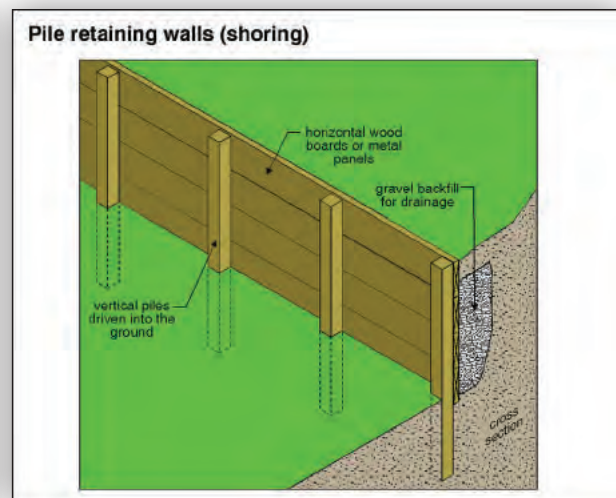
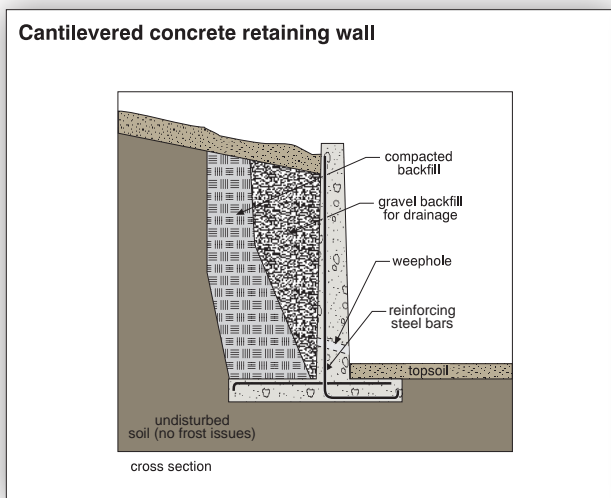
8.0 Retaining Walls

DESCRIPTION Analyzing retaining walls is a tricky business. With most retaining walls, the important components are not visible. Also, determining the rate of movement of a retaining wall is impossible from a one-time visit. Monitoring is normally required. In some cases, the angle of the wall gives a clue to the performance. Most walls are built with a slight lean to the higher side. If the wall is leaning away from the high side, it has probably moved. Once retaining walls begin to move, they rarely stop, although the movement may be slow and seasonal.

MATERIALS Retaining walls can be constructed of concrete, masonry, stone, wood or steel. There are several different designs.

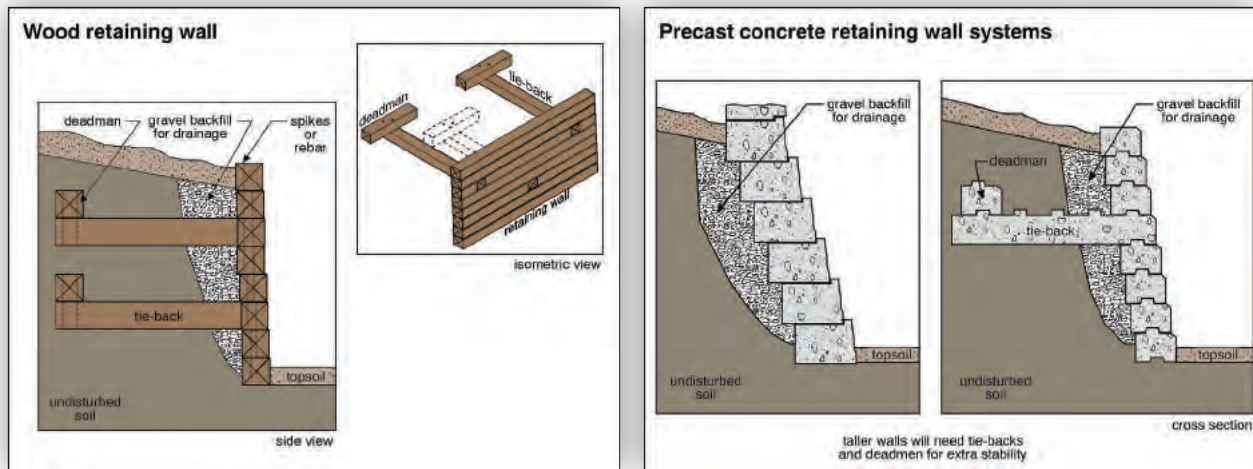
CANTILEVERED WALLS Poured concrete retaining walls are typically a cantilever design. Looking at a cross section through the wall, the wall would look like an inverted “T”. The bottom portion of the inverted “T” is buried beneath the soil. The portion of the “T” under the high side of the wall uses the weight of the soil to resist movement of the wall. The portion of the “T” protruding under the soil on the low side of the wall keeps it from tilting forward. Steel reinforcing bars keep the “T” from breaking at the joint. Cantilevered retaining walls extend below the frost line in cold climates to prevent heaving.

PILE WALLS Pile walls have vertical members driven into the soil. They resist rotational movement caused by the soil on the high side of the wall. Piles can be wood or steel.



WOOD WALLS Wood retaining walls are common. Horizontal members are tied back into the soil with anchors (tie-backs) – wood members heading back into the soil. Tie-backs are staggered through the wall system to provide resistance to movement. In some cases, “dead men” are attached to the ends of the anchors to help secure the anchors. These horizontal members run parallel to the retaining wall itself. These walls do not extend below the frost line.

PREFAB WALLS Precast concrete wall systems with interlocking sections also use tie-backs and dead men.

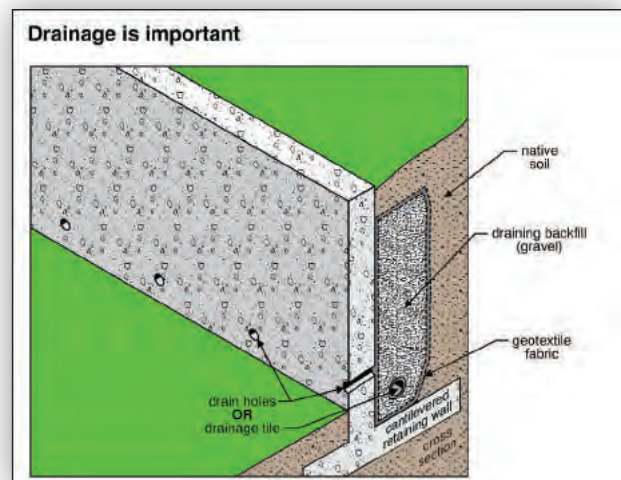


GABIONS Gabions are also used as retaining wall systems. A gabion is a rectangular wire mesh basket filled with rock. They are commonly seen along river banks to prevent erosion.

Common Problems with Retaining Walls

MOVEMENT / CRACKED/ROT The single biggest enemy of retaining walls is water. Saturated soil puts pressure on retaining walls. If saturated soil freezes, expansion forces can be significant. Walls may move as a single unit, leaning away from the hill or may crack and break apart. Water also promotes rot of wooden retaining wall systems.

POOR DRAINAGE Well-built retaining walls have a layer of gravel behind the wall and weep/drainage holes at the bottom. We don't want water trapped behind the wall. Open wall systems with wood timbers for example, have enough natural openings that drainage holes are not needed.



Minor repairs to retaining walls can be done by the homeowner. Patching cracked concrete retaining walls allows for monitoring of future movement. Major retaining wall repairs or modifications should be left to an expert. Retaining walls are often poorly built and can be very expensive to repair or replace.

